FOSSIL AND RECENT SIMPLE CORALS FROM JAPAN

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BY

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(With 4 Plates)

Contents

I. INTRODUCTION

The materials treated in this article are mostly registered and preserved in the collection of the Institute of Geology and Palaeontology, Tôhoku Imperial University, Sendai, Japan. Parts of them are also stored in the Imperial Fisheries Experimental Station, Tokyo, the Imperial Fisheries Institute, Tokyo, the Zoological Institute of the Tokyo Imperial University, and the Seto Marine Biological Laboratory of the Kyôto Imperial University at Seto, Wakayama-ken.

The greater part of the fossil materials dealt with was collected by the former and present members of our Institute of Geology and Palaeontology, Tôhoku Imperial University; all of them are derived from the Neogene and later deposits of Japan. Specimens obtained from rocks older than the Neogene being mostly unfavourable in preservation were not taken into the present study.

Recent specimens are mostly from the continental shelf bordering Honsyû, Sikoku and Kyûsyû; that around Hokkaidô, Karahuto (Saghalien), Taiwan (Formosa) and the Ryûkyû islands is not yet systematically surveyed and very little is known about its coral fauna.

Collection grounds of the recent materials.

Many extensive areas on the continental shelf were dredged by the surveying ship "Sôyô-maru" of the Imperial Fisheries Institute, Tokyo during 1922–1930. A brief account of the corals collected in this occasion was already published by us in 1932[1]; in this work we have discriminated 89 species and subspecies of deep water corals in 30 genera and subgenera distributed in 6 families; many of the new species then named were left undescribed, and some of the species and subspecies names then used were found to need alteration by our later studies.

Additional materials later acquired are from the collections of the following surveying ships and of the Marine Biological Stations of the Tokyo, Kyôto, Kyûsyû and Tôhoku Imperial Universities.

The "Sititô-maru" of the Tokyo Fisheries Experimental Station, Tokyo: material from the Zenisu-gyosyô and the vicinity of the small islets lying near the Izu-Siti-tô (the Seven Islands of Izu), Central Japan.

The "Husa-maru" of the Tiba Prefectural Fisheries Experimental Station at Tateyama-Hôzyô-mati: material from the shallow sea bordering the Pacific side of Tiba Prefecture.

The "Hukui-maru" of the Hukui Prefectural Fisheries Experimental Station at Hukui: material from the Wakasa Bay and its vicinity.

The Misaki Marine Biological Station of the Tokyo Imperial University: material from Misaki (Miura Peninsula, Kanagawa-ken) and its vicinity, obtained by dredging.

The Seto Marine Biological Laboratory of the Kyôto Imperial University: material from the sea around the station at Seto-Kanayama, Nisi-Muro-gun, Wakayama-ken, obtained at various occasions by Dr. F. HIRO and other members of that University.

The Asamusi Marine Biological Station of the Tôhoku Imperial University: material from Aomori-wan (Mutu-Bay) near the Station, obtained by Prof. S. HÔZAWA, Dr. N. ABE and other members of the station.

The Tomioka Marine Biological Station of the Kyûsyû Imperial University: material from the adjacent sea of the station at Tomioka, Amakusa-Kami-sima, Kumamoto-ken, kindly offered for our study by Prof. H. OHSHIMA and Dr. H. IKEDA of that University.

Besides, there are materials from some other sources: that dredged up by the staffs of the Mie Prefectural Fisheries Experimental Station at Owase and Hamazima, both of Mie-ken,

1) YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, pp. 387–390.

that dredged up by Prof. S. HÔZAWA from the sea off Wagu, Sima-gun, Mie-ken, and another from Toyama Bay obtained by Prof. K. KIKUTI of the Toyama High School during his biological survey.

The geographical position of these stations together with their respective oceanographical data and coral fauna are given in chapter V of this work.

Collection fields of the fossil material.

Fossil simple corals dealt with in this work are mostly from the following districts and there are a few more localities which lie in other regions. The most prolific locality of simple corals in excellent preservation is on the upper plateau of Kamikatetu, Kikai-zima, where they occur in a certain horizon of the Ryûkyû limestone formation, together with abundant bryozoa-remains.

Pleistocene and Pliocene deposits of Tiba, Ibaraki, Kanagawa and Sizuoka-ken.

Pliocene deposits of Kôti-ken.

Neogene deposits of Miyazaki-ken.

Ryûkyû limestone formation of Kikai-zima, Kagosima-ken, (Uppermost Pliocene or lowest Pleistocene).

Pliocene Simaziri beds of Okinawa-zima, Okinawa-ken.

Pliocene Byôritu beds of Taiwan.

The present work contains the simple corals only, and it is by no means exhaustive, there being left several forms to be dealt with in another occasion.

84 species and subspecies are treated in the present work and 15 of them belong to those already recorded by foreign authors from Japan, while the remaining 70 have first been rendered known to us during 1932–1940. 16 new species are to be described in chapter IV, and 7 of them were reported, but not described under the respective specific names, in 1932.[2] Only one species (*Acanthocyathus spiniger* KENT) previously recorded from Japan is not represented in our collection.

Our earlier publications on simple corals are as follows:

1) 1932, Some Recent and Fossil Corals of the Genus *Stephanophyllia* H. MICHELIN from Japan. Sci. Rep. Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XV, No. 2, pp. 56–63.

2) 1932, Notes on a Fossil Turbinolian Coral, *Odontocyathus japonicus,* nov. sp., from Segoe near Takaoka-machi, Province of Hyûga. Jap. Jour. Geol. Geogr., Vol. IX, Nos. 3–4, pp. 149–152.

3) 1932, A New Species of *Endopachys, Endopachys japonicum,* from a Younger Cenozoic Deposit of Japan. Jap. Jour. Geol. Geogr., Vol. X, Nos. 1–2, pp. 11–17.

4) 1932, *Rhizopsammia minuta* VAN DER HORST var. *mutsuensis,* nov., an Eupsammid Coral. Sci. Rep. Tôhoku Imp. Univ., 4th Ser. (Biol.), Vol. VII, No. 2, pp. 207–209.

5) 1932, Corals of the Genera *Heteropsammia* and *Oulangia* from Japan. Jap. Jour. Geol. Geogr., Vol. X, Nos. 1–2, pp. 19–31.

6) 1932, A Study of the Recent Deep-Water Coral Fauna of Japan. Proc. Imp. Acad., Vol. VIII, No. 8, pp. 387–390.

7) 1932, Deep-Water Corals from the Riukiu Limestone of Kikai-jima, Riukiu Islands. Proc. Imp. Acad., Vol. VIII, No. 9, pp. 442–445.

8) 1934, Probable Generic Identity of *Stephanophyllia* MICHELIN and *Micrabacia* M. EDWARDS and J. HAIME. Proc. Imp. Acad., Vol. X, No. 5, pp. 278–281.

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2) YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

9) 1936, Deep-Water Corals from off Owase, Mie Prefecture. Proc. Imp. Acad., Vol. XII, No. 6, pp. 167–168.

10) 1937, Notes on *Deltocyathus* and *Discotrochus* from Japan. Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, pp. 127–147.

11) 1941, Corals of Toyama Bay. Bull. Biogeogr. Soc. Jap., Vol. XI, No. 7, pp. 38–41.

12) 1942, Fossil and Recent *Flabellum* from Japan. Sci. Rep. Tôhoku Imp. Univ., 2nd Ser. Vol. XXII, No. 2, pp. 87–103, Pls. V–VIII.

Except for some colonial corals all the species treated in the above listed publications are included in the present work.

II. PREVIOUS WORKS

Previous to the publication of our papers cited above, the deep water corals and non-reef-building littoral corals of Japan had been very little studied and their descriptions appeared only sporadically in a score or more different publications between 1857 and 1932.

Nearly all of the original specimens of corals described are now preserved in the Museums of Europe and America, and are not easily accessible for direct comparison with our specimens. In consequence there is no way else than to do our generic and specific identification relied solely on literatures. So far as the available literatures are concerned, the Japanese simple corals have been recorded in the following publications:

1) H. MILNE EDWARDS and J. HAIME, 1857, Histoire naturelle des Caralliaires ou Polypes proprement dits, tome II.

Desmophyllum dianthus (ESPER), *Flabellum distinctum* MILNE EDWARDS & HAIME.

Locality cited: Japan, without further information. Both species are abundantly represented in our material.

2) A. E. VERRILL, 1869, Synopsis of Polyps and Corals. Proc. Essex Inst., Vols. IV, V, VI, (1857–60).

Eupsammia stimpsoniana VERRILL. Loc. Kagosima Bay, 25 fms. After REHBERG (1892) this species may be identical with *Balanophyllia socialis* SEMPER, which is now generally regarded as a synonym of *Balanophyllia affinis* SEMPER.

Stephanoseris japonica VERRILL. Loc. Kagosima Bay, 25 fms.
Stephanoseris lamellosa VERRILL. Loc. Loo Choo Islands. (Ryûkyû islands).

These two species are described by VERRILL without figures and in so far as the original descriptions are concerned they may probably be indistinguishable from *Heterocyathus aequicostatus* MILNE EDWARDS & HAIME; but VAUGHAN (1905) who examined the original specimens ascertained the eupsammid-like characters of them in perforated septa and wall. v. MARENZELLER (1888), once described *Heterocyathus japonicus* (VERRILL) from off Enosima, Sagami Bay, which seems to be a form very variable; he also described *Heterocyathus aequicostatus* M. EDWARDS & HAIME. We have now many specimens closely allied to these forms, most of which are from the Japan Sea, Mutu Bay and the coast of North-East Japan to the north of Bosyû and there are only a few specimens from the southern sea of Japan which can with doubt be assigned to this species. At present we believe that the two species are specifically identical and that the specific name *Heterocyathus japonicus* (VERRILL) is to be applied for them. *Stephanoseris caruthausi* FELIX from the Pliocene and Pleistocene of Java and Japan is also nothing but this species.

3) W. SAVILLE KENT, 1871, On Some New and Little-known Species of Madrepores.. Proc. Zool. Soc. London, 1871.

Acanthocyathus spiniger KENT *Flabellum matricidum* KENT

Both are cited: Japan, and the precise localities of the original are not given by KENT. There is no further information of these species by later authors. The former species is also not represented in our material. The latter may not be a true *Flabellum*, but probably be a species of *Aulocyathus*. In the general form of the corallum it strongly resembles our *Fragilocyathus conotrochoides*, but is characterized by having spongy columella. A specimen from the Toyama Bay, formerly assigned by us to *Fragilocyathus* ? sp. may probably be assignable to this species.

4) P. M. DUNCAN, 1876, Notices of Some Deep-Sea and Littoral Corals from the Atlantic Ocean, Caribbean, Indian, New Zealand, Persian Gulf, and Japanese and Corean Seas. Proc. Zool. Soc. London, 1876.

Deltocyathus orientalis DUNCAN Loc. 34° 12′ N., 136° 20′ E., 52 fms.

Javania insignis DUNCAN Loc. 34° 13′ N., 136° 13′ E., 49 fms.

The former species is one of the most dominant simple corals of Japan and is evidently identical with *Deltocyathus lens* ALCOCK, a species of world wide distribution. The latter species is form of *Desmophyllum* and we have two specimens doubtfully assignable to this species; one of them comes from near the type locality.

5) H. N. MOSELEY 1881, Report on the Corals. Part 3, On the Deep-Sea Madreporaria. Rep. Challenger Exped. Zool. II, Vol. VII, 1881.

Flabellum japonicum MOSELEY Loc. Off Enosima, 345 fms., off Omaezaki, 565fms.

Bathyactis symmetrica MOSELEY Loc. East of Japan, 2300–2900 fms.

The former is a large, beautiful, very slightly compressed species of *Flabellum* and we have examined some six specimens from Central and South-West Japan. The latter species is also represented in our collection; there is also the *Diaseris*-form of this species.

6) A. ORTMANN, 1888, Studien über Systematik und geographische Verbreitung der Steinkorallen. Zool. Jahrb. Syst. Geogr. Biol. Thiere, Bd. III, 1888.

Stephanophyllia superstes ORTMANN Loc. Sagami Bay.

This may probably be a young specimen of *Stephanophyllia formosissima* MOSELEY as already pointed out in our former work (YABE and EGUCHI, 1932).

7) E. VON MARENZELLER, 1888, Ueber das Wachsthum der Gattung *Flabellum* Lesson. Zool. Jahrb. Syst. Geogr. Biol. Thiere, Bd. III.

Flabellum japonicum MOSELEY

Flabellum candeanum MILNE EDWARDS & HAIME

Flabellum coalitum V. MARENZELLER

Probably his specimens of these species are from Sagami Bay; his description of them concerning the septal arrangement is quite characteristic and in detail, but is not accompanied with figures. The third species may probably be nothing but an abnormal form of *Flabellum distinctum* M. EDWARDS & HAIME, which is a common species of Japanese *Flabellum*.

8) E. VON MARENZELLER, 1888, Ueber einige japanische Turbinoliiden. Ann. K. K. Nat.-hist. Hofmus., 1888.

Caryophyllia japonica V. MARENZELLER

Heterocyathus japonicus (VERRILL)

Stephanotrochus spiniger V. MARENZELLER

Cyathoceras rubescens MOSELEY

His specimens are mostly from off Enosima, Sagami Bay. These four species as well as all the species of *Flabellum* treated by him are represented in our collection. *Caryophyllia japonica* V. MARENZELLER is quite similar to his *Caryophyllia arcuata* M. EDWARDS & HAIME (V. MARENZELLER, 1904), but he gives no remarks on their discrimination. We have many speci-

mens of *Caryophyllia*; while some of them are safely assignable to *C. japonica*, the majority agree fairly well with *Caryophyllia ephyala* ALCOCK (1898) from the Indian Ocean, which is, according to V.D. HORST (1931), synonymous with *Caryophyllia arcuata* M. EDWARDS & HAIME. The latter species is, in so far as MILNE EDWARDS & HAIME's original description is concerned, represents a much larger form than our specimens. These Japanese forms are now assigned to *Caryophyllia japonica*; it is the most common type of the Japanese simple corals, its Japanese name being "Tyôzi-gai".

The second species evidently belongs to *Heterocyathus aequicostatus* MILNE EDWARDS & HAIME as already stated by VAUGHAN in 1905.

The third species which is also rather common in Japan is to be called *Odontocyathus spiniger* (V. MARENZELLER), which is conspecific with *Odontocyathus sexradiis* ALCOCK from the East Indies.

The fourth species is rare and there are only a few examples in our collection.

9) T. W. VAUGHAN, 1900, A New fossil species of *Caryophyllia* from California, and a new genus and species of Turbinolid coral from Japan. Proc. U. S. Nat. Mus., Vol. XXII.

Levipalifer orientalis VAUGHAN Loc. Bôsyû (Awa).

As pointed out in our former papers (YABE and EGUCHI, 1932, 1937), the species belongs to *Deltocyathus*; and transferred to the genus, the specific name is preoccupied by DUNCAN's species. We have used the specific name *Deltocyathus vaughani* YABE & EGUCHI for it; this is one of the common corals of Japan.

10) C. J. VAN DER HORST, 1922, Eupsammidae, Siboga Exped. Monogr., Vol. XVIc.

Balanophyllia gigas BRÜGGEMANN (M.S.) MOSELEY, 1881.

Dendritic or colonial Eupsammid corals are treated with in this work and some of them are from Japan; the present species is the only simple coral among them. It is one of the most common species of simple corals distributed widely in central and south-western Japan. V.D. HORST described it in detail, but the locality is simply cited as Japan.

Fossil simple corals hitherto recorded from Japan are quite few. In 1926, Prof. J. MAKIYAMA first described, in Japanese, three commensal species of simple corals; *Heterocyathus elberti, Stephanoseris carthausi* and *Heteropsammia ovalis* from the Pleistocene deposits near Sasage, Tiba-ken and all of them are now represented in our collection. In 1931, Prof. I. HAYASAKA recorded the presence of fossil simple corals in the Byôritu beds of Taiwan.

III. A SYSTEMATIC CATALOGUE OF FOSSIL AND RECENT SIMPLE CORALS FROM JAPAN

Madreporaria Imperforata MILNE EDWARDS & HAIME

Family Turbinolidae MILNE EDWARDS & HAIME, VERRILL

Genus *Desmophyllum* EHRENBERG, 1834

Desmophyllum EHREEBERG, 1834, Corall. roth. Meer., p. 299.

Genotype: *Desmophyllum crista-galli* MILNE EDWARDS & HAIME.

1) *Desmophyllum dianthus* (ESPER). Pl. IX(I), Figs. 1, 2, 3.

Madrepora dianthus ESPER, 1797, Fortsetzungen der Pflanzenthiere, t. I, p. 85, Madrepora, pl. LXIX.
Caryophyllia dianthus DE BLAINVILLE, 1830, Dict. sci. nat., t. LX, p. 310 (cited after BLAINVILLE, 1834).
Desmophyllum dianthus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 254: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor. II, p. 77: ORTMANN, 1890, Zeit. wiss. Zool., Bd. L, p. 11.

Among numerous specimens of deep-sea corals from Sagami Bay, collected off Misaki and off Enosima and now stored in the Institute of Zoology of the Imperial University of Tokyo,

we found many specimens of *Desmophyllum* which are most probably referable to *Desmophyllum dianthus* (ESPER), because a brief description of the species by M. EDWARDS and HAIME, 1857, quoted below, adheres fairly well to our materials.

"Polypier à base médiocrement large et légerèment flexueuse, peu élevé. Les côtes des trois premiers cycles cristiformes près du calice. Six cycles, complets, et même quelques cloisons d'un 7e. Le calice est très-semblable à celui du *D. crista-galli*. Son petite axe est situé sur un plan un peu inférieur a celui de grand. Habit le Japon."

Desmophyllum crista-galli MILNE EDWARDS & HAIME, which is closely allied form, possesses less numerous septa and more elevated corallum.

We have figured several of our specimens in different stages of growth on the accompanying plate Pl. IX (I): a large specimen (Fig. 1) coincides especially well with the description of *Desmophyllum dianthus* cited above, while another specimen (Fig. 2) represents a more elevated form; the latter grows over the dead basal part of the corallum. Smaller specimens, on the other hand look more like *Desmophyllum crista-galli* in general aspect, though easily distinguished from it by the features already pointed out above. The following description is based on several well preserved specimens from Sagami Bay.

Corallum simple, somewhat porcellaneous in external view, compressed, subflabelliform, usually more or less distorted to one side, and stalked: fixed with a broad base upon foreign bodies, or frequently attaching to another corallum of the same species and then forming colony-like groups. Calice oval or elliptical, usually cocoon-shaped owing to the median constriction, which is variably strong in different individuals: calicular margins strongly convex upwards in full grown specimens and less in younger ones, the convexity gradually increasing with age. Laterally covered by low and rounded granulations and bearing costae which are discontinuously elevated to thin prominent ridges. Septa much exsert, projecting upwards as well as outwards, 100–196 in number, of which about 24 of the first three cycles are strongly developed and subequal. Septa of the primary and secondary cycles slightly thickened along their inner free margin: those of the fourth cycle considerably lower than the older ones, extending about half way to calicular center. Septa of the fifth and sixth cycles thin and short; rudimentary ones of the seventh visible only in full grown specimens; youngest septa adjacent to the principal ones surpassing all the others in height except those of the first three cycles. All the septa entire along their free margin, and covered on their lateral surface by rather distant granules arranged in rows diverging upwards. Columella and endotheca absent, leaving the calicular center vacant. Wall not extending to very calicular margin, being overhanged by outer margin of septa.

Dimensions (in mm): (of specimens from off Enosima)

Longer diameter of calice	77	30	21	20
Shorter diameter of calice	42	(28) 18	16	16
Height of corallum	55	30	37	27
Number of septa	195	120	100	99

(28) is the constricted shorter diameter.

Prominently exsert and crowded septa easily distinguish this species from the others of the same genus.

Distribution: Japan, off Misaki and Enosima, both in Sagami Bay, some 200–400 fms. (Reg. Nos. 43412, 56556, 57497, 57498, 57496); off Seto, Wakayama-ken (Reg. No. 56584); Sôyô-maru St. 344 (Reg. No. 50522). MILNE EDWARDS and HAIME (1857) and ORTMANN have also recorded it from Japan. East Indies (ESPER).

2) *Desmophyllum* cf. *alabastrum* ALCOCK. Pl. IX(I), Fig. 4.

Compare:

Desmophyllum alabastrum ALCOCK, 1902, Siboga Exped., Monogr., Vol. XVIa, p. 28, pl. IV, figs. 27, 27a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XX, p. 64, pl. V, figs. 11, 12.

Corallum as in *Desmophyllum alabastrum* ALCOCK from the Philippines, but slightly more compressed, calice being ovate and more or less constricted at the middle, upper margin of calice raised slightly higher on the shorter axis than on the longer; septa 96 in number in the specimen examined, arranged in five regular cycles of hexameral plan, hence having one more cycle of septa than in the type of this species. In calicular view (Fig. 4a) principal septa, viz., septa of the first two cycles large, distinct and much thickened at wall, projecting slightly upwards and outwards: costae opposite to the principal septa distinct near the calicular margin. Stalk rather slender, encrusting foreign body at base.

Dimensions (in mm):

Longer diameter of calice	19
Shorter diameter of calice	13
Diameter of stalk	6
Height of corallum	25

A single somewhat worn specimen is here provisionally assigned to this species.

Distribution: Japan, Sôyô-maru St. 288 (Reg. No. 59132). Sulu Sea, 275–522 m (ALCOCK).

3) *Desmophyllum* cf. *insigne* DUNCAN. Pl. IX(I), Fig. 5, 6.

Compare:

Desmophyllum (*Javania*) *insignis* DUNCAN, 1876, Proc. Zool. Soc. London, p. 435, pl. XXXIX, figs. 11–13: v. MARENZELLER, 1906, Denksch. k. Akad. Wiss. Math.-Nat. Kl., Wien, Bd. LXXX, 1907, p. 23, pl. II, fig. 6.

Corallum just like *Javania insignis* as figured by DUNCAN and v. MARENZELLER, in shape; but according to DUNCAN's original description his specimen from Japan is characterized by having well developed epitheca and by that characteristic alone he distinguished the subgenus *Javania* from the typical *Desmophyllum*. We have examined two specimens: one of them is almost identical with the figured specimen of DUNCAN, the locality being also nearly the same in both; however, we could not ascertain the presence of epitheca: the second specimen is also the same in size, but the wall and septa of the corallum is much thicker and stout, and at first we took it as representing a new species, basing on the lack of epitheca. However, the two specimens are quite similar in other characteristics.

Dimensions (in mm):

Longer diameter of calice	25	20
Shorter diameter of calice	18	
Height of corallum	25	25

Distribution: Japan, off Kuki, Sima-gun, Mie-ken (Reg. No. 50521); off Misaki, Kanagawa-ken (Reg. No. 43413). DUNCAN's original specimen is from off Mie-ken, 34° 13′ N., 136° 13′ E., 48 fms. Red Sea (v. MARENZELLER).

4) *Desmophyllum delicatum* YABE & EGUCHI, nov. Pl. IX(I), Fig. 7.

Description in Chapter IV.

Distribution: Japan, Sôyô-maru St. 22 (Reg. No. 59131).

Genus *Fragilocyathus* YABE & EGUCHI, 1932

Fragilocyathus YABE & EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389.

Genotype: *Fragilocyathus conotrochoides* YABE & EGUCHI

5) *Fragilocyathus conotrochoides* YABE & EGUCHI.

Fragilocyathus conotrochoides YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 390, fig. 2.

Description in Chapter IV.

Distribution: Japan, Sôyô-maru St. 199 (Reg. No. 50085); St. 259 (Reg. No. 53673); St. 352 (Reg. No. 50084); St. 546 (Reg. No. 53675); St. 553 (Reg. No. 53674); St. 572 (Reg. No. 53676); St. 652 (Reg. No. 50083). The present species is not yet known outside Japanese seas, endemic?

Genus *Aulocyathus* v. MARENZELLER, 1904

Aulocyathus v. MARENZELLER, 1904, Valdivia Exped., VII, p. 300.

Aulocyathus v. MARENZELLER, 1904, Valdivia Exped., VII, p. 300.

6) *Aulocyathus* cf. *matricidus* (KENT).

Flabellum matricidum KENT, 1871, Proc. Zool. Soc. London, p. 276, pl. XXIII, figs. 2, 2a–c.

"Corallum elongate, almost cyclindrical, attached by its base. Calicular fossa circular, very deep. Theca exceedingly slender, invested by a complete epitheca. Septal cycles four in number, the last cycle incomplete. Primary and secondary septa scarcely exsert; lateral surfaces of septa granulate, their inner edge delicately flexuous above, thickened inferiorly, and becoming lost in the trabecular elements of the rudimentary columella. Costae even, distinct throughout. Hab. Japan."

This is the original description of *Flabellum matricidum* by KENT given in 1871 based on the specimens from Japan of which the exact locality is not recorded. A specimen from Toyama Bay is safely assignable to this species; it has a rudimentary columella apparently smaller than in the type, otherwise agreeing well with the original description and figures by KENT.

In the general shape of the corallum the present species is similar to *Aulocyathus juvenescens* v. MARENZELLER from the East African coast in 400–463 m depth, but the latter is more slender. *Schizocyathus fissilis* POURTALÈS is another similar species; but according to v. MARENZELLER, *Aulocyathus* is easily distinguishable from *Schizocyathus* by the different mode of development of the septa. *Fragilocyathus conotrochoides* YABE & EGUCHI is easily distinguished from the present species by lacking columella.

Distribution: Japan, Toyama Bay (Reg. No. 58223). Japan (KENT, 1871).

Genus *Cyathoceras* MOSELEY, 1881

Cyathoceras MOSELEY, 1881, Rep. Challenger, Zool., 11, Vol. VII, p. 156.

Genotype: *Cyathoceras cornu* MOSELEY

7) *Cyathoceras diomedae* VAUGHAN. Pl. IX(I), Fig. 8.

Cyathoceras diomedae VAUGHAN, 1907, U. S. Nat. Mus., Bull. 59, p. 77, pl. VII, figs. 1–2: VAUGHAN, 1919, Ann. Rep. Smithsonian Inst., 1917, pl. XIII, figs. 2, 2a.

Two specimens of a beautiful *Desmophyllum*-like coral are examined; both have a well developed columella easily visible in its calicular fossa, thus decidedly differing from *Desmo-*

phyllum. Cyathoceras diomedae from the Hawaiian waters in every respect agrees with our specimens. One of them is figured in the accompanying plate Pl. IX(I), Fig. 8: dimensions: diameter of calice 25×21 mm, diameter of stalk 7 mm, height of corallum 39 mm, number of septa 90. VAUGHAN's original description holds good and there is no need of further notes.

Distribution: Japan, Sôyô-maru St. 331 (Reg. No. 53694); off Kominato, Tiba-ken, 30 m (Reg. No. 50087). Hawaiian Islands (VAUGHAN).

8) *Cyathoceras rubescens* MOSELEY.

Cyathoceras rubescens MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 157, pl. II, fig. 8: v. MARENZELLER, 1888, Ann. K. K. Nat.-hist. Hofmus, Bd. III, p. 21.

V. MARENZELLER once described *Cyathoceras rubescens* MOSELEY from the sea of Enosima; there is now a single well preserved specimen at our disposal.

This agrees in every respect with V. MARENZELLER's description and also with that of the type specimen by MOSELEY; it, however, is characterized by possessing well developed costae while both the specimens from the Kei islands and Japan examined by V. MARENZELLER are described as wanting costae. The corallum is reddish brown in colour in V. MARENZELLER's specimens; this is also the case with ours.

Distribution: Japan, Sôyô-maru St. 425. Sagami Bay (v. MARENZELLER); East Indies (Kei Islands) (MOSELEY).

9) *Cyathoceras niinoi* YABE & EGUCHI, nov. Pl. IX(I), Fig. 9.
Description in Chapter IV.

Distribution: Japan, Hukui-maru St. 44 (Reg. No. 59070).

Genus *Ceratotrochus* MILNE EDWARDS & HAIME, 1848

Ceratotrochus MILNE EDWARDS & HAIME, 1848, Monogr. Turb. p. 248.

Genotype: *Ceratotrochus multiserialis* MILNE EDWARD & HAIME.

10) *Ceratotrochus hiugaensis* YABE & EGUCHI, nov. Pl. IX(I), Fig. 10.
Description in Chapter IV.

Distribution: Japan, Sôyô-maru St. 309 (Reg. No. 50246); St. 315 (Reg. No. 50245). Both localities are in Hyûga-nada, the Pacific coast of Hyûga, Kyûsyû.

Subgenus *Conotrochus* SEGUENZA 1863

Conotrochus SEGUENZA, 1803, Cor. Ter. Messina, II p. 83.

Subgenotype: *Conotrochus typus* SEGUENZA.

11) *Ceratotrochus* (*Conotrochus*) *funicolumna* ALCOCK.

Ceratotrochus (*Conotrochus*) *funicolumna* ALCOCK, 1902, Siboga Exped., Monogr., Vol. XVIa, p. 11, pl. I, figs. 6, 6a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr., XXII, p. 66, pl. IX, figs. 7, 8.

Four specimens with quite short, curved, conical simple corallum are assigned to this species. The figured one is the most typical and almost a duplicate of ALCOCK's original figure, even in size.

Distribution: Japan, Sôyô-maru St. 268 (Reg. No. 50243); St. 356; St. 368 (Reg. No. 50015). Sulu Sea, 450–522 m (ALCOCK).

12) *Ceratotrochus* (*Conotrochus*) *parahispidus* YABE & EGUCHI, nov. Pl. IX(I), Fig. 12.

Description given in Chapter IV.

Distribution. Japan, Sôyô-maru St. 259; St. 309 (Reg. No. 50245); St. 323 (Reg. No. 50247); St. 343 (Reg. No. 50248); St. 356; St. 368 (Reg. No. 59015); St. 414 (Reg. No. 59014); St. 419 (Reg. No. 59016).

13) *Ceratotrochus* (*Conotrochus*) *elongatus* YABE & EGUCHI. Pl. IX(I), Figs. 13, 14.

Ceratotrochus (*Conotrochus*) *elongatus* YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Description given in Chapter IV.

Distribution: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60757).

In our former paper (YABE and EGUCHI, 1932) we thought this to be conspecific with *C. parahispidus*, but it is evidently a distinct species. Known only from the type locality.

Genus ***Discotrochus*** MILNE EDWARDS & HAIME, 1848

Discotrochus MILNE EDWARDS et HAIME, 1848, Monogr. Turb. p. 251: VAUGHAN, 1900, U.S. Geol. Surv., Monogr. XXXIX, p. 79.

Genotype: *Discotrochus orbignyanus* MILNE EDWARDS & HAIME

Subgenus ***Cylindrophyllia*** YABE & EGUCHI, 1937

Cylindrophyllia YABE & EGUCHI, 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 142.

Subgenotype: *Cylindrophyllia minimus* YABE & EGUCHI.

14) *Discotrochus* (*Cylindrophyllia*) *minimus* YABE & EGUCHI, 1937.

Discotrochus (*Cylindrophyllia*) *minimus* YABE and EGUCHI, 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.) Vol. XIX, No. 1, p. 146, pl. XX, figs. 16–22.

Distribution: Japan, Recent; Toyama Bay (Reg. Nos. 58224, 60416). Fossil; Neogene of Tiba-ken (Reg. No. 50547); Byôritu beds of Taiwan (Reg. Nos. 50011, 60382, 60390, 50023, 60393, 50012, 60381, 60383, 60385, 60395, 60360, 30361).

Genus ***Placotrochides*** ALCOCK 1902

Placotrochides ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 33.

Genotype: *Placotrochides scaphula* ALCOCK.

15) *Placotrochides*? *kikutii* YABE & EGUCHI. Pl. IX(I), Fig. 16.

Placotrochides kikutii YABE & EGUCHI, 1941, Bull. Biogeograph. Soc. Japan, Vol. XI, No. 7, p. 40.

Description given in Chapter IV.

Distribution: Japan, Toyama Bay (Reg. No. 63088).

Genus ***Caryophyllia*** LAMARCK, 1801

Caryophyllia LAMARCK, 1801, Syst. Anim. sans Vert., p. 370: STOKES, 1828, Zool. Jour. Vol. III, p. 486: DUNCAN, 1884, Jour. Linn. Soc. London, Zool., Vol. XVIII, p. 24: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 67.

Genotype: *Caryophyllia cyathus* LAMARCK.

16) *Caryophyllia japonica* v. MARENZELLER. Pl. X(II), Figs. 1, 2, 3.

Caryophyllia japonica v. MARENZELLER, 1888, Ann. K. K. Nat.-hist. Hofmus. Bd, III, p. 16.
Caryophyllia ephyala ALCOCK, 1898, Deep-Sea Madreporaria ... "Investigator", p. 13, pl. I, figs. 4, 4a: ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 9: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 69: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 388.
Caryophyllia arcuata v.D. HORST, 1931, Rec. Ind. Mus. Vol. XXXIII, pt. 1, p. 3.

v. MARENZELLER's type specimens of the present species are from Enosima. Although not accompanied with any figure, his description is so in detail that we can easily identify our specimens here figured, pl. X(II), Fig. 1 and 3 from Sagami Bay with his species. In 1904 he described precisely *C. arcuata* MILNE EDWARDS & HAIME from the 'Valdivia' collection; in this occasion he did not compare it with his Japanese species. Recently (1931) v.D. HORST who referred his specimen from the Indian ocean to *C. arcuata* stated that *C. ephyala* ALCOCK from the Indian Sea is conspecific with it. In our material there are many "Tyôzi-gai" (the Japanese name), and these are mostly small and attached. They show many variations even in the elevation of exsert septa and of costae, in the shape of columella, in granulations on the faces of pali and septa, and some of them are indistinguishable from *C. ephyala* ALCOCK.

So far as the original description of *C. arcuata* MILNE EDWARDS & HAIME is concerned, it is decidedly larger than our specimens; it is therefore thought better provisionally to apply the specific name *C. japonica* v. MARENZELLER for the Japanese "Tyôzi-gai".

Some juvenile specimens of *C. scobinosa* are also similar to the present species, but the latter in full-grown stage is usually free.

Distribution: Japan, all around Honsyû, Sikoku, Kyûsyû, ranging from shallow water to deeper sea. Most of the specimens from the Japan-Sea side are small in size and have the septa uniformly less exsert. Sôyô-maru St. 107 (Reg. No. 60751); St. 109 (Reg. No. 59005); St. 123 (Reg. No. 53683); St. 147 (Reg. No. 60753); St. 208 (Reg. No. 60759); St. 220 (Reg. No. 59007); St. 255 (Reg. No. 59009); St. 244 (Reg. No. 56577); St. 270 (Reg. No. 59004); St. 271 (Reg. Nos. 59002, 59001); St. 279 (Reg. No. 56572); St. 288 (Reg. Nos. 56573, 59003); St. 262 (Reg. No. 59012); St. 325 (Reg. No. 60750); St. 326 (Reg. No. 59008); St. 331 (Reg. No. 59011); St. 425 (Reg. No. 60733); St. 595 (Reg. No. 59006); St. 361 (Reg. No. 59001); St. 580 (Reg. No. 53632); St. 600 (Reg. No. 53633); St. 608 (Reg. No. 60744); St. 610 (Reg. No. 53630); St. 637 (Reg. No. 60761); Toyama Bay (Reg. No. 60415): Husa-maru St. 45 (Reg. No. 59044); St. 53 (Reg. No. 59067); St. 85 (Reg. No. 59068).

Philippines (Sulu Sea, 522 m). Banda Sea, 204–390 m. Indian Ocean, Andamans, 220–240 fms, Laccadive Islands, 705 fms, Seychelles, 44 fms. Providence, 70 fms. Saya de Malha, 300–500 fms. *C. arcuata* MILNE EDWARDS & HAIME was recorded from Mediterranean Sea (DÖDERLEIN) and off South Africa (v. MARENZELLER).

17) *Caryophyllia scobinosa* ALCOCK. Pl. X(II), Figs. 4, 5.

Caryophyllia scobinosa ALCOCK, 1902, Siboga Exped., Monogr., Vol. XVIa, p. 8, pl. I, figs. 2, 2a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 89, pl. VIII, figs. 10, 11: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 388.

It is a simple coral usually free, and more or less curved cylindroconical. We have examined many specimens from Japan; the pali and principal septa are almost always 12, exceptionally 11, in number as in the former species. The elevation of the principal septa and compression of the calice vary to some extent. Pl. X(II), Fig. 4 represents a specimen with a shallow circular calice, having principal septa not much exsert; all the septa and pali are covered by pointed granules on the lateral faces. In Fig. 5, on the other hand, we have shown one of the most common types of the present species, in which the principal septa are exsert

and calice is more compressed and polygonal. Besides, there are many intermediate forms and in every respect they seem to agree with *C. scobinosa* ALCOCK from the East Indies.

Caryophyllia scobinosa decapali YABE and EGUCHI has also the same shape and size, but the arrangement of septa and pali is always decameral.

Distribution: Japan, Sôyô-maru St. 336 (Reg. No. 53628); St. 437 (Reg. No. 59013); St. 428 (Reg. No. 59010); St. 441 (Reg. No. 53629).

18) *Caryophyllia scobinosa decapali* YABE & EGUCHI, nov. Pl. X(II), Fig. 6, 7.

Description given in Chapter IV.

Distribution: Japan, Sôyô-maru St. 210 (Reg. No. 53640); St. 220 (Reg. No. 53637); St. 222 (Reg. No. 53636); St. 293 (Reg. No. 53638); St. 329 (Reg. No. 53639); St. 439 (Reg. No. 59066); off Tyôsi, Tiba-ken (Reg. No. 59069).

A similar form, *Caryophyllia quadragenaria* ALCOCK comes from East Indies, (Siboga St. 90, 1° 17.5′ N., 118° 58′ E., 54–281 m; Siboga St. 251, 5° 28.4′ S., 132° 0.2′ E., 204 m; Siboga St. 289, 9° 0.3′ S., 126° 24.5′ E., 112 m) (ALCOCK).

19) *Caryophyllia* cf. *alcocki* VAUGHAN. Pl. X(II), Fig. 8.

Compare:

Caryophyllia alcocki VAUGHAN, 1906, U. S. Nat. Mus., Bull. 59, p. 73, pl. V, figs. 1, 1a, 1b: VAUGHAN, 1919, Ann. Rep. Smithsonian Inst., 1917, pl. XIII, figs. 3, 3a.

Two specimens are referred to this species: their dimensions (in mm) follow:

Longer diameter of calice	19	16
Shorter diameter of calice	14.5	14
Height of corallum	19	16

The smaller specimen is figured (Pl. X(II), Fig. 8); 12 well developed pali and principal septa are distinct and prominent. It is quite similar to VAUGHAN's original specimen according to his description and figures, except for the different shape of calice and size of corallum, calice being circular and corallum larger in the latter. The detailed description of the typical species fairly well fits our specimen. On the other hand, *C. clavus*, *C. ambrosia*, and *C. scaelliomorpha*, all from the Indian Ocean are also similarly shaped, but have pali and principal septa more than 12 in number.

Distribution: Japan, Sôyô-maru St. 223 (Reg. No. 53625); St. 414 (Reg. No. 50244). Hawaiian Islands (VAUGHAN).

20) *Caryophyllia paucipaliata* YABE & EGUCHI, Pl. X(II), Figs. 9, 10, 11.

Caryophyllia paucipaliata YABE and EGUCHI, 1932, Proc. Imp. Acad. Vol. VIII, No. 8, p. 443. Three different specimens are figured.

Description given in Chapter IV.

Distribution: Japan, Ryûkyû limestone of Kikai-zima, Kagoshima-ken (Reg. No. 60740).

21) *Caryophyllia paraoctopali* YABE & EGUCHI, nov. Pl. X(II), Fig. 12.

Description in Chapter IV.

Distribution: Japan, Sôyô-maru St. 285 (Reg. No. 53645); St. 294 (Reg. No. 53646); off Hosozima, Miyazaki-ken (Reg. No. 53647).

Genus ***Premocyathus*** YABE & EGUCHI, nov.

Diagnosis and remarks given in Chapter IV.

Genotype: *Caryophyllia compressa* YABE & EGUCHI.

22) *Premocyathus compressus* (YABE & EGUCHI). Pl. X(II), Figs. 13, 14.

Description given in Chapter IV.

Distribution: Japan, Sôyô-maru St. 179 (Reg. No. 53644); St. 212 (Reg. No. 53641); St. 316 (Reg. No. 53543); St. 332 (Reg. No. 53642); St. 549 (Reg. No. 59139). Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60747); Pleistocene, Narita beds of Zizôdo, Makuta-mura, Kimitu-gun, Tiba-ken (Reg. Nos. 38346, 60368); valley north of Ôwasi, Naka-mura, Kimitu-gun, Tiba-ken (Reg. No. 60363).

Genus *Acanthocyathus* MILNE EDWARDS & HAIME, 1848

Acanthocyathus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 293.

Genotype: *Acanthocyathus grayi* MILNE EDWARDS & HAIME.

23) *Acanthocyathus grayi* MILNE EDWARDS & HAIME.

Acanthocyathus grayi MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 293, pl. IX, figs. 2, 2a: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor. II, p. 22: ALCOCK, 1898, Deep-Sea Madreporaria ... "Investigator", p. 15: V.D. HORST, 1931, Rec. Ind. Mus. Vol. XXXIII, pt. 1, p. 6: UMBGROVE, 1938, Zool. Meded., Vol. XX, p. 264.

Two beautiful specimens, somewhat brownish in colour are stored in the collection of the Seto Marine Biological Laboratory of the Kyôto Imperial University. MILNE EDWARDS and HAIME's original description and figures of this species are quite adequate and both of the specimens examined are almost duplicates of the original figure. ALCOCK and V.D. HORST did not figure nor describe their specimens.

Corallum of the present species is very stout, and truncated above; septa three sized, 16 well developed principal septa and pali are equal and prominent. Both lateral edges provided with three or four horizontal spines which are compact and much compressed.

Dimension (in mm):

(Seto Mar. Biol. Lab.) Reg. No. III.	24	25
Longer diameter of calice	28	26
Shorter diameter of calice	20	19
Height of corallum	32	28
Number of septa	64	64

Two specimens measured above are full grown forms, and we have no juvenile specimens of this species from the present seas. Recently we have examined a small fossil specimen from Mindoro, Philippines, which evidently belongs to the present species. Besides we have some ten specimens safely assignable to *Acanthocyathus malayicus* GERTH, which is quite similar in lateral view to *Trochocyathus laterocristatus* MILNE EDWARDS & HAIME, though the similarity is in lateral view only. Very recently (1940), UMBGROVE has revised *A. malayicus* GERTH and stated that *A. malayicus* of GERTH and *Trochocyathus laterocristatus* MILNE EDWARDS & HAIME of FELIX are conspecific with *A. grayi* MILNE EDWARDS & HAIME. But so far as our material concerns *A. malayicus* has 48 septa in regular hexameral arrangement of which only 12 are principal septa and pali, while *A. grayi* has usually 16 principal ones and has more than 48 septa even in juvenile stage.

Distribution: Japan, off Seto, Wakayama-ken. Indian Ocean (off Andaman), 185 fms. off Arakan coast, 20–70 fms. off C. Negrais, Burma, 40–49 fms. Andaman, 53 fms. 8 miles W. of Interview Island, Andamans, 45–270 fms. off Port Blair, Andamans, 100 fms (After ALCOCK and V.D. HORST). MILNE EDWARDS and HAIME give no locality of their specimen.

Pliocene of Tônohama, Aki-gun, Kôti-ken (Reg. No. 50523) (*A. malayicus*); Pliocene of Sumagui, Bongabon, Mindanao (Reg. No. 65241) (juvenile example of *A. grayi*). Upper Neogene of Borneo and Java; Pliocene of Timor; Plio-Pleistocene of Ceram (after UMBGROVE, FELIX, GERTH, as *A. malayicus* or *A. grayi*).

24) *Acanthocyathus spiniger* KENT.

Acanthocyathus spiniger SAVILLE KENT, 1871, Proc. Zool. Soc. London, p. 275, pl. XXIII, fig. 1.

This species was once recorded from Japan; but is not represented in our collection. According to KENT it is more or less similar to *A. grayi* on one hand and related to *A. spinicarensis* from the Philippines on the other.

Distribution: Japan (after KENT).

Genus *Goniocyathus* YABE & EGUCHI, 1932

Goniocyathus YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389.

Genotype: *Goniocyathus pacificus* YABE & EGUCHI.

25) *Goniocyathus pacificus* YABE & EGUCHI Pl. X(II), Figs. 15, 16.

See below.

Goniocyathus pacificus YABE and EGUCHI 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389, fig. 2.

Distribution: Japan, Sôyô-maru St. 113 (Reg. No. 50089); St. 180 (Reg. No. 50088); St. 198 (Reg. Nos. 50097, 50086); St. 199 (Reg. No. 53671); St. 200 (Reg. No. 50090); St. 304 (Reg. No. 59017).

Genus *Citharocyathus* ALCOCK, 1902

Citharocyathus ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 21.

Genotype: *Citarocyathus conicus* ALCOCK.

26) *Citharocyathus conicus* ALCOCK. Pl. X(II), Figs. 17, 18.

Citharocyathus conicus ALCOCK, 1902, Siboga Exped., Monogr. XVIa, p. 22, pl. III, figs. 18, 18a.
Citharocyathus venustus ALCOCK, 1902, loc. cit., p. 22, pl. III, figs. 19, 19a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 78, pl. VI, figs. 6, 7: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Four recent specimens and some 30 fossils are examined. At the beginning of our study we simply followed ALCOCK in distinguishing *C. conicus* and *C. venustus* as two independent species; after careful examination of our rich materials, however, these two were found not to be distinctly dividible to two species or even to subspecies, the extreme types being connected by intermediate forms and the differences emphasized by ALCOCK being found as due to different growth-stages. Usually full grown individuals have more exsert septa and slender corallum than younger ones which are short conical; denticulation of costae is variable in individuals.

Distribution: Japan, Sôyô-maru St. 322 (Reg. No. 53685); St. 324 (Reg. No. 53684). Fossil, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60738). Philippines, 522 m (ALCOCK). East Indies, 300 m (ALCOCK).

Genus *Peponocyathus* GRAVIER, 1915

Peponocyathus GRAVIER, 1915, Bull. Inst. Ocean. Monaco, 304, p. 5: GRAVIER, 1920, Res. Camp. Sci. Monaco, Fasc. LV, p. 38.

Genotype: *Peponocyathus variabilis* GRAVIER.

27) *Peponocyathus orientalis* YABE & EGUCHI.

Peponocyathus orientalis YABE and EGUCHI, Proc. Imp. Acad., Vol. VIII, No. 9, p. 444, figs. 1–6.

Distribution: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 43423).

Genus *Trochocyathus* MILNE EDWARDS & HAIME, 1848

Trochocyathus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 300.

Genotype: *Trochocyathus mitratus* (GOLDFUSS).

28) *Trochocyathus pileus* ALCOCK. Pl. X(II), Figs. 19, 20.

Trochocyathus pileus ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 15, pl. II, figs. 11, 11a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 81, pl. VII, figs. 7, 8.
? *Ceratotrochus venustus* ALCOCK, 1902, loc. cit., p. 10, pl. I, figs. 5, 5a.
Trochocyathus (Tropidocyathus) intermedius YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Six recent and one fossil specimens are examined, some of them (Pl. X(II), Figs. 20a, 20b) agree well with the original description by ALCOCK of the type from the East Indies; variation, however, appears in rather wide extent; for instance, some specimens have rather broad or ventricose base (Pl. X(II), Figs. 19a, 19b), and were in former occasion erroneously assigned to the subgenus *Tropidocyathus* under the new specific name *Tropidocyathus intermedius*. This specimen having no lateral wings evidently belongs to the present species. Usually younger individuals of this species has more pointed base.

Ceratotrochus venustus ALCOCK from the East Indies was established on a single more or less worn specimen; it differs from the present species only by lacking pali, which probably has been worn out.

Distribution: Japan, Sôyô-maru St. 220 (53693); St. 286 (Reg. No. 53689); St. 304 (Reg. No. 53687); St. 423 (Reg. No. 53686); St. 425 (Reg. No. 53688). Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. Nos. 60738, 60743).

Philippines, 397–522 m (ALCOCK).

29) *Trochocyathus caryophylloides* ALCOCK. Pl. X(II), Fig. 21.

Trochocyathus caryophylloides ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 14, pl. II, figs. 10, 10a: FAUSTINO, 1927, Philippine Bur. Sci. Monogr. XXII, p. 80, pl. VII, figs. 5, 6.

Two specimens of different size but otherwise quite similar to each other are assigned to this species. Dimensions (in mm):

Reg. No.	53623	59129
Longer diameter of calice	21	15
Shorter diameter of calice	18	13
Height of corallum	27	15
Number of septa	64	—

The larger specimen is illustrated, Pl. X(II), Fig. 21. The principal septa and pali are 32 in number; the latter are arranged in one crown, and evidently in two different sizes. In the figured specimen, a group of costal striae on the concave side of the basal part of the corallum runs straight while others on either side of the former diverge from the former; excepting for this peculiar, probably abnormal costal striation it agrees quite well with ALCOCK's original description. The other specimen which is much smaller has normal straight costae.

On the other hand, the present specimens show some resemblance with *C. profunda* MOSELEY and *C. communis* MOSELEY, but differ from them in the number of pali and their ar-

rangement. In the present species, the pali are arranged in one crown or circle, and show some relationship with the normal Trochocyathid pali in being of two different sizes.

Distribution: Japan, Sôyô-maru St. 107 (Reg. No. 59129); St. 331 (Reg. No. 53626); Philippines and East Indies, 204–304 m (ALCOCK).

Subgenus ***Tropidocyathus*** MILNE EDWARDS & HAIME, 1848

Tropidocyathus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 326.

Subgenotype: *Tropidocyathus lessoni* (MICHELIN).

30) *Trochocyathus* (*Tropidocyathus*) cf. *lessoni* MILNE EDWARDS & HAIME.

Tropidocyathus lessoni MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 327: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor. II, p. 57: ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 17, pl. II, figs. 14, 14a.

A single but well preserved specimen with the following dimensions is assigned to this species.

Longer diameter of calice	14.5 mm
Shorter diameter of calice	9.5 „
Height of corallum	14 „

In nearly all features the present specimen agrees well with MILNE EDWARDS and HAIME's original description, but has costae much finer than in the typical species; further its lateral wing is less developed than in one figured by ALCOCK (ALCOCK, 1902, op. cit. pl. II, fig. 14).

Distribution: Japan, Sôyô-maru St. 420 (Reg. No. 53692). East Indies, 69–390 meters (ALCOCK). Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60743).

31) *Trochocyathus* (*Tropidocyathus*) *wellsi* YABE & EGUCHI, nov. Pl. X(II), Fig. 22.

Description in Chapter IV.

Distribution: Japan, Sôyô-maru St. 439 (Reg. No. 53691).

Subgenus ***Thecocyathus*** MILNE EDWARDS & HAIME, 1848

Thecocyathus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 317.

Subgenotype: *Cyathophyllum tintinabulum* GOLDFUSS.

32) *Trochocyathus* (*Thecocyathus*) *hanzawai* YABE & EGUCHI. Pl. X(II), Figs. 23, 24, 25.

Trochocyathus (*Thecocyathus*) *hanzawai* YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443 (Nom. nud.)

Description given in Chapter IV.

Distribution: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60749).

Genus ***Odontocyathus*** MOSELEY, 1881

Odontocyathus MOSELEY, 1881, Rep. Challenger, Zool., VII, p. 148.

Genotype: *Trochocyathus coronatus* POURTALÈS.

33) *Odontocyathus spiniger* (V. MARENZELLER). Pl. X(II), Figs. 26, 27, 28a.

Stephanotrochus spiniger V. MARENZELLER, 1888, Ann. K. K. Nat.-hist. Hofmus., Bd. III, p. 20.
Stephanotrochus tatei DENNANT, 1898–99, Trans. Roy. Soc. S. Australia, XXIII, p. 117, pl. III, figs. 1a–c.
Odontocyathus sexradiis ALCOCK, 1902, Siboga Exp., Monogr. Vol. XVIa, p. 23, pl. III, figs. 30, 20a, b.
Odontocyathus sp. ALCOCK, 1902, loc. cit., p. 24.
Odontocyathus stella ALCOCK, 1902, loc. cit., p. 24, pl. III, fig. 21, 21a, b.
? *Odontocyathus sundaicus* GERTH, 1923, Samml. geol. Reichs-mus. Leiden, Ser. 1, Bd. X, p. 53, pl. I, figs. 9, 10.

Some twenty specimens of this beautiful, six rooted, saucer-shaped coral are examined. They show some variations among them and all the corals bearing different names listed in the synonym-table may probably be one and the same species, for which V. MARENZELLER's *spiniger* of the earliest date is to be applied. The three specimens here figured show three different forms; Pl. X(II), Fig. 26 is a common form almost identical with *Stephanotrochus spiniger* V. MARENZELLER from off Enosima, while Fig. 28 is a larger specimen safely referable to *Odontocyathus sexradiis* ALCOCK from the East Indies, and Fig. 27 a younger disc-shaped one closely similar to *Odontocyathus stella* ALCOCK from the East Indies. *Odontocyathus tatei* DENNANT from the Neogene of Australia is another synonymous species. *Odontocyathus coloradus* SMITH from a younger deposit of the Philippines may also probably be included in this species and *Odontocyathus sundaicus* GERTH from a younger deposit of Java is almost indistinguishable from some juvenile specimens of this species.

Distribution: Japan, Sôyô-maru St. 211 (Reg. No. 50230); St. 293 (Reg. No. 50238); St. 307 (Reg. No. 50242); St. 329; St. 417 (Reg. No. 50241); St. 425 (Reg. No. 39738); off Enosima, Kanagawa-ken (V. MARENZELLER). East Indies, 411–560 m (ALCOCK).

Fossil; Neogene of Australia (*Odontocyathus tatei* DENNANT); Neogene of Java (? *O. sundaicus* GERTH).

34) *Odontocyathus japonicus* YABE & EGUCHI.

Odontocyathus japonicus YABE and EGUCHI, 1932, Jap. Jour. Geol. Geogr., Vol. IX, Nos. 3–4, p. 151, pl. XIV, text-figs. 1–3.

Distribution: Japan, Neogene of Segoe, near Aya-mati, Miyazaki-ken (Reg. No. 40876).

Genus ***Deltocyathus*** MILNE EDWARDS & HAIME, 1848

Deltocyathus MILNE EDWARDS & HAIME, 1848, Monogr. Turb., p. 325.

Genotype: *Deltocyathus italicus* (MICHELOTTI).

35) *Deltocyathus orientalis* DUNCAN.

Deltocyathus orientalis DUNCAN, 1876, Proc. Zool. Soc. London, p. 431, pl. XXXVIII, figs. 4–7: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 388: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 442: YABE and EGUCHI, 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 135, pl. XX, figs. 1–10.

Deltocyathus lens ALCOCK, 1902, Siboga Exped., Monogr. XVIa, p. 19, pl. II, figs. 16, 16a: GRAVIER, 1920, Res. Camp. Sci. Monaco, facs. LV, p. 36, pl. III, figs. 47–54, pl. XIII, figs. 200, 201: UMBGROVE, 1925, Rep. Pleistocene and Pliocene Corals from Ceram, p. 14, pl. I, figs. 8–10.

Distribution: Japanese seas, 59–494 m deep; Sôyô-maru St. 5 (Reg. No. 50055); St. 23 (Reg. No. 50042); St. 53 (Reg. No. 59065); St. 54 (Reg. No. 59058); St. 59 (Reg. No. 50033); St. 90 (Reg. No. 50035); St. 110 (Reg. No. 50041); St. 126 (Reg. No. 50054); St. 139; St. 140; St. 222 (Reg. No. 50040); St. 238 (Reg. No. 50038); St. 240 (Reg. No. 50046); St. 247 (Reg. No. 50052); St. 249 (Reg. No. 53679); St. 251 (Reg. No. 50006); St. 254 (Reg. No. 50007); St. 259; St. 322 (Reg. No. 50048); St. 324 (Reg. No. 50047); St. 429 (Reg. No. 50051); St. 447 (Reg. No. 59084); St. 502 (Reg. No. 50034); St. 504 (Reg. No. 50044); St. 520 (Reg. No. 50005); St. 523 (Reg. No. 50043); St. 530 (Reg. No. 50053); St. 540 (Reg. No. 50050); St. 549 (Reg. No. 50007); St. 553 (Reg. No. 50049); St. 621 (Reg. No. 50045); off Kinkazan, Miyagi-ken, (Reg. Nos. 38344, 38342, 38349, 38219); Toyama Bay, (Reg. Nos. 58225, 60409, 60413).

Philippines and East Indies, 379–4914 m. Mediterranean Sea, 599–914 m.

Fossil distribution:[1] Neogene and Pleistocene of Tiba-ken, Ibaraki-ken, Kanagawa-ken, and Neogene of Kôti-ken; Ryûkyû limestone of Kikai-zima, Kagosima-ken; Simaziri beds of

1) For the details of fossil localities see Chapter VI.

Okinawa-zima, Okinawa-ken; Byôritu beds of Taiwan (Formosa); Upper Pliocene of Ceram (UMBGROVE).

36) *Deltocyathus magnificus* MOSELEY.

Deltocyathus magnificus MOSELEY, 1876, Proc. Roy. Soc. London, Zool. p. 662: MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 147, pl. IV, figs. 10, pl. XIII, figs. 1, 2: ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 20: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 76, pl. VI, figs. 3–5: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 388: YABE and EGUCHI, 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 138, pl. XX, figs. 13, 14.

Distribution: Japan, Sôyô-maru St. 210 (Reg. No. 50063); St. 293 (Reg. No. 50074); St. 301 (Reg. No. 50002); St. 316 (Reg. No. 50071); St. 323 (Reg. No. 50075); St. 325 (Reg. No. 50001); St. 326 (Reg. No. 50069); St. 412 (Reg. No. 50070); St. 438 (Reg. No. 50064); St. 439; St. 444 (Reg. No. 50072); St. 451 (Reg. No. 50077). Philippines, 129 fms. (MOSELEY), 15 m (ALCOCK). East Indies, 118–794 m (ALCOCK).

37) *Deltocyathus vaughani* YABE & EGUCHI.

Deltocyathus vaughani YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 288: YABE and EGUCHI, 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 9, pl. XX, figs. 11–12.
Levipalifer orientalis VAUGHAN, 1900, Proc. U. S. Nat. Mus., XXII, p. 199, text-fig.

Distribution: Japan, Sôyô-maru St. 213 (Reg. No. 49779); St. 247 (Reg. No. 49774); St. 323 (Reg. No. 50078); St. 336 (Reg. No. 50003); St. 361 (Reg. No. 50061); St. 366; St. 368 (Reg. No. 50068); St. 372 (Reg. No. 50060); St. 419 (Reg. No. 50066); St. 420; off Bôsyu (VAUGHAN).

Genus *Deltocyathoides* YABE & EGUCHI, 1932

Deltocyathoides YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389.

Genotype: *Deltocyathoides japonicum* YABE & EGUCHI.

38) *Deltocyathoides japonicum* YABE & EGUCHI.

Deltocyathoides japonicus YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389, fig. 3: YABE and EGUCHI, 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 14, pl. I, figs. 23a–c.

Distribution: Off the Pacific coast of central and northern Japan; Sôyô-maru St. 21 (Reg. No. 50091); St. 200 (Reg. No. 53677); St. 204 (Reg. No. 53678); St. 249 (Reg. No. 53679); St. 259 (Reg. No. 56585); St. 135 (Reg. No. 53680).

Genus *Paracyathus* MILNE EDWARDS & HAIME, 1848

Paracyathus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 318.

Genotype: *Paracyathus stokesii* MILNE EDWARDS & HAIME.

39) *Paracyathus pruinosus* ALCOCK. Pl. XI(III), Fig. 1.

Paracyathus pruinosus ALCOCK, 1902, Siboga Exped. Monogr. Vol. XVIa, p. 18, pl. III, figs. 17, 17a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 73, pl. V, figs. 15, 16: V.D.HORST, 1931, Rec. Ind. Mus., Vol. XXXIII, pt. 1, p. 9, pl. I, figs. 9, 11, pl. II, fig. 6.

Four specimens examined show little variation and perfectly agree with ALCOCK's original description and figures. There is no need of farther explanation. The figured specimen (Pl. XI(III), Fig. 1) is almost a duplicate of the original.

Distribution: Japan, Sôyô-maru St. 233 (Reg. No. 53682); St. 235 (Reg. No. 53681). Sulu Sea, 15 m (FAUSTINO); Indian Ocean (Saya de Malha, 150 m) (V.D. HORST). It is evidently a typical Indo-Pacific element.

Genus ***Heterocyathus*** MILNE EDWARDS & HAIME, 1848

Heterocyathus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 323.

Genotype: *Heterocyathus aequicostatus* MILNE EDWARDS & HAIME.

40) *Heterocyathus aequicostatus* MILNE EDWARDS & HAIME. Pl. XI(III), Figs. 2–5.

Heterocyathus aequicostatus MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 321, pl. X, fig. 8: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor., II, p. 51: GARDINER, 1902, Marine Investigation in S. Africa, II, p. 105: BOURNE, 1905, Ceylon Pearl Oyster Fisheries, Suppl. Rep., No. XXIX, p. 193: HARRISON and POOLE, 1909, Proc. Zool. Soc. London, p. 898, pl. LXXXV, figs. 1a–f: HARRISON, 1911, Proc. Zool. Soc. London, p. 1021; FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 83, pl. VIII, figs. 1–7; YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: SAKAKURA, 1935, Jour. Geol. Soc. Japan, Vol. XLII, p. 186.
Heterocyathus rousseaui MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 324, pl. X, figs. 9, 9a.
Stephanoseris rousseanus MILNE EDWARDS et HAIME, 1857, Hist. nat. cor. II, p. 56.
Heterocyathus philippinensis SEMPER, 1872, Zeit. wiss. Zool. Bd. XXII, p. 254, pl. XX, figs. 12–14.
Heterocyathus parasiticus SEMPER, 1872, loc. cit., p. 255, pl. XX, figs. 17a–c.
Heterocyathus japonicus v. MARENZELLER, 1888, Ann. K. K. Nat.-hist. Hofmus. Bd. III, p. 17.
? *Heterocyathus rembangensis* GERTH, 1921, Samml. Geol. Reichs.-Mus. Leiden, N. F. I, Ab. 2, p. 397, Pl. LVII, figs. 6, 7.
Heterocyathus pulchellus REHBERG, 1892, Abhandl. Nat.-wiss. Nat. Verein Hamburg, Bd. XII, p. 8.
Heterocyathus oblongatus REHBERG, 1892, loc. cit., p. 9, Pl. II, figs. 1, 2.

Many fossil and recent species are examined, most of them agree well with the original specimen illustrated by MILNE EDWARDS and HAIME. Pl. XI(III), Figs. 3 and 4 show two specimens almost identical with their figures, (compare MILNE EDWARDS and HAIME, 1848, op. cit., pl. X, figs. 8 and 9). Younger specimens are usually rather low and disc-shaped; one of them is here figured (Pl. XI(III), Figs. 5a and 5b). The corallum varies in shape according to the shape and size of the shells upon which they attach and finally completely cover them by a thin basal extension. Costae much vary individually even among the specimens from the same locality in the ornamentation and size, and in their extension on the basal film. As shown in the synonymic table several different names were given by various authors fully discussed the variation. At first we also tried to distinguish several varieties in our abundant material; but we were unsuccessful owing to the presence of many intermediate forms.

Distribution: Japan, Sôyô-maru St. 259 (Reg. No. 53662); St. 286 (Reg. No. 56575); St. 290 (Reg. No. 5679); St. 11 (Reg. No. 59061); St. 301 (Reg. No. 53650); St. 316 (Reg. No. 53661); St. 331 (Reg. No. 53649); St. 332 (Reg. No. 53653); St. 349 (Reg. No. 53651); St. 352 (Reg. No. 53654); St. 428 (Reg. No. 53648); St. 429 (Reg. No. 53659); off Siwogama, Matusima-Bay, Miyagi-ken (Reg. No. 53664); off Minato-mati, Tiba-ken (Reg. No. 59069); off Seto, Wakayama-ken.

Pleistocene of Sasage, Tiba-ken (MAKIYAMA); Zizôdô, Tiba-ken (coll. UEDA); near Tonbe, Sizuoka-ken (Reg. No. 60375); Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 53655); Byôritu beds of Taiwan (HAYASAKA).

China sea. Philippines. Burma. Ceylon. Persian Gulf. South Africa. Neogene of Philippines (SEMPER). Neogene of Java (GERTH, FELIX). Sumagui beds of Sumagui, Mindanao, Philippines (coll. HASIMOTO.).

41) *Heterocyathus japonicus* (VERRILL). Pl. XI(III), Fig. 6.

Stephanoseris japonica VERRILL, 1866, Proc. Essex Inst., Vol. VI, p. 47.
Stephanoseris lamellosa VERRILL, 1866, loc. cit., p. 51.
Stephanoseris carthausi FELIX, 1913, Palaeontogr., Vol. IX, p. 332, pl. XXVII, figs. 9, 9a, b: 1915 FELIX, Pal. von Timor, II, p. 36: MAKIYAMA, 1926, Jour. Geol. Soc. Tokyo, Vol. XXXIII, p. 5: SAKAKURA, 1935, Jour. Geol. Soc. Japan, Vol. XLII, p. 189.

A species similar to *H. aequicostatus* MILNE EDWARDS & HAIME, but more delicately built; pali never so distinct as in the former species; costae alternating in size, thinner ones coloured more dark or gray; wall and septa perforated as usual in Eupsammid corals; although few in number, septa distinctly forming 6 deltoid groups Pl. XL(III), Fig. 6). *Stephanoseris carthausi* FELIX well described by FELIX from the younger deposits of Java agrees with our specimens.

Although not mentioned by VERRILL, VAUGHAN revising in 1905 the original specimens of VERRILL's three species, ascertained in all of them perforate wall and septa and the deltoid groups of septa of the Eupsammid type.

Distribution: Japan, Sôyô-maru St. 83 (Reg. No. 53670); St. 86 (Reg. No. 53668); St. 308 (Reg. No. 53663); St. 342 (Reg. No. 53660); St. 472 (Reg. No. 53671); St. 493 (Reg. No. 53666); Husa-maru St. 45 (Reg. No. 59069); off Moura-zima, Mutu-Bay (Reg. No. 53669); Siwogama Bay, Miyagi-ken (Reg. No. 53664).

Fossil: Byôritu beds of Naikotô, Byôritu-gun, Taiwan (Reg. No. 60364); Narita beds of Zizôdô, Tiba-ken (SAKAKURA). Neogene of Java (FELIX).

Recently Dr. JOHN W. WELLS, in a letter dated May 3, 1941, informed one of us (M. EGUCHI), that *Stephanoseris japonica* and S. *lamellosa* are identical, and that *S. carthausi* FELIX is the same as *S. japonica*.

Genus *Culitia* DANA, 1848

Culitia DANA, 1848, U. S. Expl. Exped., Zool., p. 376.

Genotype: *Culitia stellata* DANA.

42) *Culitia japonica* YABE & EGUCHI.

Culitia japonica YABE and EGUCHI, 1936, Proc. Imp. Acad., Vol. XII, No. 6, p. 167, figs. 1–3.

Distribution: Japan, off Owase, Mie-ken, some 100 m (Reg. No. 59328).

Family **Anthemiphylliidae** VAUGHAN, 1907

Genus *Anthemiphyllia* POURTALÈS, 1878

Anthemiphyllia POURTALÈS 1878, Bull. Mus. Comp. Zool., V, p. 205.

Genotype: *Anthemiphyllia patera* POURTALÈS.

43) *Anthemiphyllia dentata* (ALCOCK).

Discotrochus dentatus ALCOCK, 1902, Siboga Exped., Monogr., Vol. XVIa, p. 27, pl. IV, figs. 26, 26a: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1937, Sc. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 143, pl. XX, fig. 15.

Discotrochus sp. YABE and EGUCHI (pars), 1937, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XIX, No. 1, p. 19.

'Discotrochus' dentatus of our former paper (1937, p. 143) may probably belong to *Anthemiphyllia*. The younger specimens agree fairly well with the Hawaiian species *A. pacifica* VAUGHAN; is the latter a juvenile form ?

Some seven small specimens included in *'Discotrochus'* sp. in our former paper cited afore may also belong to the present genus. They may most probably be young individuals of the above species; a few of them are much smaller than others and having septa quite crowded afford a different appearance. For further study more materials are needed.

Distribution: Japan, Sôyô-maru St. 179 (Reg. No. 50029); St. 220 (Reg. No. 50026); St. 239 (Reg. No. 50025); St. 293 (Reg. No. 50031); St. 301 (Reg. No. 50037); St. 327 (Reg.

No. 50036); St. 352 (Reg. No. 50092); St. 420 (Reg. No. 50027); St. 440 (Reg. No. 50032); St. 525 (Reg. No. 59088); St. 523; St. 210 (Reg. No. 50030); St. 280 (Reg. No. 50024); St. 283 (Reg. No. 56570); St. 331; St. 286 (Reg. No. 50028). Younger forms are from the following Stations: Sôyô-maru St. 229 (Reg. No. 50080); St. 293 (Reg. No. 50079); St. 427 (Reg. No. 50082); St. 429 (Reg. No. 50031): Husa-maru St. 45 (Reg. No. 59074). Southern end of Sulu Sea, 350–495 m (ALCOCK).

Fossil: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 50021).

Family **Flabellidae** BOURNE, 1905

Genus ***Flabellum*** LESSON, 1831

Flabellum LESSON, 1831, Illustr. de Zool., pl. XIV.

Genotype: *Flabellum pavoninum* LESSON.

44) *Flabellum pavoninum* LESSON. Pl. XI(III), Fig. 7.

Flabellum pavoninum LESSON, 1831, Ill. Zool., pl.XIV: DANA, 1846, U. S. Expl. Exped. Zooph., p. 159, pl. VI, figs. 5, 6: MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 260: VAUGHAN, 1907, U. S. Nat. Mus. Bull. 59, p. 52, pl. I, figs. 2, 3: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 45, pl. I, figs. 1–9: YABE and EGUCHI, 1937, Recent and Fossil *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XXII, No. 2, pl. V, figs. 2a–c; Pl. VI, figs. 1, 2.

A single beautiful specimen figured in the accompanying plate (XI(III), Figs. 7a–c) is almost a duplicate of VAUGHAN's and FAUSTINO's figures.

Distribution: Japan, Sôyô-maru St. 437, (Reg. No. 43448). China Sea, Singapore, Philippines, 76–519 fms. S. Africa, 50–100 fms. Hawaiian Islands, 43–312 fms (cited after DANA, FAUSTINO, v. MARENZELLER, MILNE EDWARDS and HAIME, and VAUGHAN).

Fossil: Japan, Neogene of Tugaru penninsula and near Hukusima-si; Ryûkyû limestone of Okinawa-zima. Pliocene of Java (FELIX). Neogene of Nias (GERTH).

45) *Flabellum pavoninum magnificum* (v. MARENZELLER). Pl. XI(III), Fig. 8.

Flabellum magnificum v. MARENZELLER, 1904, Valdivia Exped. VII, p. 270, pl. XVII, fig. 13: YABE and EGUCHI, Sci. Rep., Tôhoku Imp. Univ., Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2, pl. V, figs. 1a–c.

A single large magnificient specimen is assigned to this species (Pl. XI(III), Figs. 8a–c). Longer axis of calice 65 mm, shorter axis 45 mm, height of corallum 40 mm, number of septa 193. The second specimen from off Seto, Wakayama-ken, recently examined by EGUCHI is almost a duplicate of the former. Both of them agree fairly well with v. MARENZELLER's original.

The present subspecies is easily distinguished from the typical species by having less crowded septa.

Distribution: Japan, Sôyô-maru St. 416 (Reg. No. 50094); off Seto, Wakayama-ken. East Indies (Sumatra, 470 m) (v. MARENZELLER).

46) *Flabellum pavoninum paripavoninum* ALCOCK. Pl. XI(III), Fig. 9.

Flabellum paripavoninum ALCOCK, 1898, An Account of the Deep-Sea Madreporaria ... "Investigator", p. 21, pl. II, figs. 3, 3b: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XII, p. 46, pl. II, figs. 1–4.
Flabellum pavoninum paripavoninum VAUGHAN, 1907, U. S. Nat. Mus., Bull. 59, p. 50, pl. III, figs. 1–4b: YABE and EGUCHI, 1941, Fossil and Recent *Flabellum* from Japan, Sci. Rep., Tôhoku Imp. Univ., Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2, pl. V(I), Figs. 7, 8.

Fan shaped corallum is quite characteristic for this species which bears the Japanese name 'Sensu-gai'. Many specimens are examined; as shown in the accompanying plate (Pl. XI(III), Fig. 9) the upper margin of the corallum is highly arched upwards, the angle of lateral edges varies from 90° to 140°, the figured specimen is a less opended form. Sometimes a wing-like process is born on both lateral edges and then the angle of the lateral edges is wider.

Distribution: Japan, Sôyô-maru St. 325 (Reg. No. 50100); St. 326 (Reg. No. 50098); St. 329 (Reg. No. 50015); St. 419 (Reg. No. 43441); St. 437 (Reg. No. 43442); St. 438 (Reg. No. 43446).

Philippines, 108–402 m. South China Sea (off Hongkong, 88–204 fms. East Indies, 347–559 fms (FAUSTINO). Indian Ocean (Laccadives, 636 fms (ALCOCK). Hawaiian Islands 143–241 fms (VAUGHAN).

47) *Flabellum distinctum* MILNE EDWARDS & HAIME. Pl. XI(III), figs. 10, 11, 12.

Flabellum distinctum MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 262: MILNE EDWARDS et HAIME, 1857, Hist. nat. coral, II, p. 80: DUNCAN, 1873, Trans. Zool. Soc. VIII, p. 322, pl. XXXIX, figs. 1–13: MARTIN, 1880, Die Tertiärschichten auf Java, p. 134, pl. XXIV, figs. 5–8: NOËTLING, 1899, Fauna of the Miocene Beds of Burma, p. 101, pl. I, figs. 1–4: ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 30: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1941, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ. Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

Flabellum pavoninum var. *distinctum* VAUGHAN, 1907, U. S. Nat. Mus., Bull. 59, p. 55, pl. II, figs. 5, 5a: FELIX, 1920, Jungtertiare und quartäre Anthozoen von Timor und Obi, p. 31: GRAVIER, 1920, Madreporaires provenant des Campagnes des Yachts Princesse-Alice et Hirondelle, II (1893–1913), p. 67: GERTH, 1921, Coelenterata, p. 401: RICHARDS, 1921, Post-Cretaceous rocks of Australia, p. 744: UMBGROVE, 1924, Report on Pleistocene and Pliocene corals from Ceram, p. 5: FELIX, 1927, Anthozoa miocaenica, p. 411.

Flabellum australe MOSELEY, 1881, Rep. Challenger Exped., Zool. II, Vol. VII, p. 172, pl. VII, figs. 4–5a: ALCOCK, 1902, Siboga Exped. Monogr., Vol. XVIa, p. 30.

Flabellum patens MOSELEY, 1881, loc. cit., p. 172, pl. VI, figs. 4–5a.

Flabellum chunii v. MARENZELLER, 1904, Valdivia Exped. VII, p. 274, pl. XVII, fig. 14.

Flabellum coalitum v. MARENZELLER, 1888, Zool. Jahr. Abt. Syst. Geogr. Biol. Thiere, Bd. III, p. 45.

This is one of the most common species of corals in Japan and is distributed in all over the warm seas of both the Atlantic and Indo-Pacific Oceans. In 1857, MILNE EDWARDS and HAIME already recorded its specimens obtained from Japan. Its variations are studied in detail by VAUGHAN and others: so far as our materials are concerned *F. pavoninum* and the present species are rather easily destinguishable from one another by some characteristic features in the angle between the lateral edges and the convexity of the upper margin of calice. *F. coalitum* v. MARENZELLER from Japan may probably be an abnormal form of the present species.

Distribution: Japan, Sôyô-maru St. 5 (Reg. Nos. 51219, 39730); St. 6 (Reg. No. 50839); St. 179 (Reg. No. 51214); St. 188 (Reg. No. 50849); St. 207 (Reg. No. 50840); St. 209 (Reg. No. 50837); St. 210 (Reg. No. 50862); St. 211 (Reg. No. 51235); St. 212 (Reg. No. 50829); St. 220 (Reg. No. 39736); St. 222 (Reg. No. 51222); St. 223 (Reg. No. 50844); St. 239 (Reg. No. 50842); St. 259 (Reg. No. 51234); St. 266 (Reg. No. 51240); St. 270 (Reg. No. 50848); St. 276 (Reg. No. 51241); St. 280 (Reg. No. 51221); St. 288 (Reg. No. 50841); St. 293 (Reg. No. 50843); St. 295 (Reg. No. 50852); St. 298 (Reg. No. 51229); St. 300 (Reg. No. 50850); St. 301 (Reg. No. 50820); St. 316 (Reg. No. 50838); St. 322 (Reg. No. 50828); St. 324 (Reg. No. 50880); St. 332 (Reg. No. 51245); St. 345 (Reg. No. 39731); St. 352 (Reg. No. 51244); St. 365 (Reg. No. 50847); St. 417 (Reg. No. 50878); St. 425 (Reg. No. 50857); St. 428 (Reg. No. 51243); St. 429 (Reg. No. 59732); St. 438 (Reg. No. 51242); St. 439 (Reg. No. 51224); St. 440 (Reg. No. 51232); St. 455 (Reg. No. 51237); St. 462 (Reg. No. 50832); St. 477 (Reg. No. 50824); 502 (Reg. No. 50836); St. 524 (Reg. No. 50822); St. 621 (Reg. No. 51238); St. 624 (Reg. No. 51236); Husa-maru St. 45 (Reg. No. 59064); Sititô-maru St. 3 (Reg. No. 58216); St. 8 (Reg. No. 58218); off Enosima, Kanagawa-ken (Reg. Nos. 43409, 59332, 59333, 50587); off Misaki, Kanagawa-ken (Reg. No. 56559); off Seto, Wakayama-ken (Reg. No. 39236); Tosabae, off Asizuri-zaki, Kôti-ken (Reg. No. 59090).

East Indies (off Kei Islands), 139 fms (MOSELEY); 5° 28′ 4″ N., 132° 0′ 2″ E., 204 m (ALCOCK); 7° 15′ S., 115° 15′ 6″ E., 289 m (ALCOCK); Australian Sea (off Twofold Bay, New

South Wales), 120 fms (MOSELEY); Hawaiian Islands (vicinity of Kaui Islands), 7–18 fms (VAUGHAN); Paillolo channel, between Maui and Molokai Islands, 122–143 fms (VAUGHAN); Red Sea (MILNE EDWARDS and HAIME); Mediterranean Sea (39° 85′ N., 9° 56′ W., 994 fms; 36° 44′ N., 8° 8′ W., 364 fms; 26° 29′ N., 7° 16′ W., 304 fms) (DUNCAN); Atlantic Ocean (east of Graciosa, Azores, 454 m; near Terceira, 599 m; 39° 26′ 10″ N., 31° 21′ 30″ W., 650–914 m) (GRAVIER).

Fossil: Japan, Pliocene of Tônohama, Kôti-ken (Reg. Nos. 43455, 41932); Neogene of Tonbe, Sizuoka-ken (Reg. No. 28902); Pleistocene of Kunôsan, Sizuoka-ken (Reg. No. 7957); Pleistocene of Nakahira-mati, Kuno-mura, Sizuoka-ken (Reg. Nos. 39735, 43417). Plio-Pleistocene of Ceram (*F. patens* of FELIX). Pliocene of Java (*F. australe* of FELIX). Jan Jukian Series (Miocene ?) of Victoria, S. Australia and Tasmania (RICHARDS). Miocene of Burma. Miocene of Java (GERTH). Miocene of Colline di 'Torino', Turin (FELIX).

48) *Flabellum distinctum angustum* YABE & EGUCHI.

Flabellum distinctum angustum YABE and EGUCHI, 1941, Fossil and Recent *Flabellum* from Japan. Sci. Rep. Tôhoku Imp. Univ. Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

Distribution: Fossil; Pliocene of Tônohama, Yasuda-mura, Aki-gun, Kôti-ken (Type specimens, Reg. No. 43436): Recent, off Enosima, Sagami Bay (Reg. No. 59333).

49) *Flabellum pavoninum lamellulosum* (ALCOCK).

Flabellum lamellulosum ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 30, pl. IV, fig. 28.
Flabellum pavoninum lemellulosum VAGUHAN, 1907, U. S. Nat. Mus., Bull. 59, p. 51, pl. I, figs. 1, 1a.

A large specimen which is almost a duplicate of ALCOCK's original specimen is referred to this species.

Dimension (in mm):

Maximum height of corallum	40	39
Maximum diameter of corallum	47	47
Breadth of calice	22	
Number of septa	310	336

The present specimen agrees with ALCOCK's type in the circumference of the upper border of the corallum in side view much exceeding that of a semicircle, but slightly differs from it in different angles between the lateral costae or edges; namely in the present specimen the angle is almost 180°, while in ALCOCK's original it is more opened being more than 180°. Otherwise both agree with one another in every respect. The dimensions of ALCOCK's original is given for comparison in the right hand of the above table; quoted from his work, with additional one of the breadth of calice measured from his plate (ALCOCK, 1902, loc. cit., pl. IV, figs. 28a, 28b.) According to VAUGHAN, *lamellosum* is merely a variety of *F. pavoninum* LESSON.

This subspecies is closely related with *F. pavoninum paripavoninum* from the East Indies and Japan, but the later has usually less opened angle of lateral edges and much less numerous septa.

Distribution; Japan, off Seto, Wakayama-ken, Reg. No. III, 2. East Indies, 204 m (ALCOCK); Hawaiian Islands (VAUGHAN).

50) *Flabellum rubrum* (QUOY & GAIMARD). Pl. XI(III), Figs. 13, 14.

Turbinolia rubra QUOY et GAIMAR, 1833, Voy. de l'Astrolabe, Zooph., p. 188, pl. XIV, figs. 5–9.
Euphyllia rubra DANA, 1848, U. S. Exploring Exped., Zooph., p. 161.
Flabellum elongatum MILNE EDWARDS et HAIME, 1848, Monogr. Turb. p. 275, pl. VIII, fig. 7: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor., II, p. 94.

Flabellum cumingii MILNE EDWARDS et HAIME, 1848, loc. cit., p. 275, pl. VIII, fig. 11: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 94.

Flabellum crassum MILNE EDWARDS et HAIME, 1848, loc. cit., p. 276, pl. VIII, figs. 8, 8a: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 96.

Flabellum rubrum MILNE EDWARDS et HAIME, 1848, loc. cit., p. 280: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 97: GARDINER, 1902, Marine Investigations in South Africa, II, p. 125, pls. I–IV, figs. 1–17, 22–34: GARDINER, 1902, Proc. Cambridge Philos. Soc., Vol. II, p. 462: BOURNE, 1905, On the Solitary Corals ... Marine Biology of Ceylon, Pt. IV, p. 198: GARDINER, 1906, Madreporaria, Fauna and Geogr. Maldive, Laccadive Arch. II, p. 954: FELIX, 1913, Palaeontogr. Vol. IX, p. 363: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 50, pl. III, figs. 1–9: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1933. Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ., Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

Flabellum victorae DUNCAN, 1870, Quart. Jour. Geol. Soc. London, Vol. XXVI, p. 299, pl. XIX, fig. 11.

Flabellum irregulare SEMPER, 1872, Zeit. Wiss. Zool. Bd. XXII, p. 242, pl. XVI, figs. 7–17: GERTH, 1922, Samml. geol. Reichs-mus. Leiden. N. F., I, 2 Abt., p. 402, pl. LVII, fig. 15: UMBGROVE, 1924, Rep. on pleistocene and pliocene Corals from Ceram., p. 5, pl. I, fig. 11: GERTH, 1925, Leidsche Geol. Meded. I, p. 26.

This is a very variable species, and its variation was repeatedly treated by many authors. The synonymic list shows the varied forms which were once regarded as valid species by MILNE EDWARDS and HAIME and others.

Crescent-shaped basal scar is most characteristic to this species as well as the next subspecies (*F. rubrum debile*). The scar measures 4–7 mm in longer diameter and 3–3.5 mm in the corresponding shorter diameter, has sharp border which are, in lateral or facial view, more or less arched upward parallel to the calicular margin; it bears 12–24 costal striations or trace of septa on its concave face. Further the corallum of this species shows faint radial costae in addition to growth lines which are more or less wavy on the basal half.

This is one of the most common simple corals known from Japan.

Distribution: Japan, Sôyô-maru St. 107 (Reg. No. 50231); St. 362; St. 352; St. 339; St. 223; St. 222; St. 324; St. 329; St. 331; St. 317; St. 294; St. 296 (Reg. No. 50877); St. 420; St. 422 (Reg. No. 50233); St. 428; St. 429; St. 438; St. 441; St. 444 (Reg. No. 51209); St. 457; St. 459; St. 465 (Reg. No. 50229); St. 469 (Reg. No. 50863); St. 462 (Reg. No. 51207); St. 523; St. 540 (Reg. No. 50230). China sea (MILNE EDWARDS and HAIME), off Honkong, 88 fms (FAUSTINO); Philippines, 6–10 fms (SEMPER), 16–510 fms (FAUSTINO). New Zealand (MILNE EDWARDS and HAIME); Indian Ocean, 24–37 fms (GARDINER, BOURNE). Cape Colony (GARDINER).

Fossil: Japan, Neogene of Sizuoka-ken; Pliocene of Tônohama, Kôti-kèn; Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. Nos. 29233, 43434). Pliocene of Java. Neogene of Nias. Plio-Pleistocene of Ceram. Pleistocene of Borneo. Miocene of Java and Australia (FELIX, GERTH).

51) *Flabellum rubrum debile* (MILNE EDWARDS & HAIME). Pl. XI(III), Fig. 15.

Flabellum debile MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 270, pl. VIII, fig. 2: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor., II, p. 88.

Flabellum spinosum MILNE EDWARDS et HAIME, 1848, loc. cit., p. 271, pl. VIII, fig. 4: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 88.

Flabellum aculeatum MILNE EDWARDS et HAIME, 1848, loc. cit., p. 271, pl. VIII, fig. 4: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 87.

Flabellum owenii MILNE EDWARDS et HAIME, 1848, loc. cit., p. 278, pl. VIII, fig. 9: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 96.

Flabellum stokesii MILNE EDWARDS et HAIME, 1848, loc. cit., p. 273, pl. VIII, fig. 12: MILNE EDWARDS et HAIME, 1857, loc. cit., p. 96: MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 172: GERTH, 1922, Samml. geol. Reichs-mus. Leiden, N. F. I, 2 Abt., p. 401, pl. LVII, fig. 14: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 54, pl. III, figs. 10–21: YABE and EGUCHI, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1933, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ., Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

Flabellum variabile SEMPER, 1872, Zeit. Wiss. Zool., Bd. XXII, p. 245, pl. XVII–XVIII, figs. 1–10: GERTH, 1922, Samml. geol. Reichs-mus. Leiden, N. F. I., 2 Abt., p. 401, pl. LVII, fig. 30: UMBGROVE, 1926, Neogene en Pleistocene Korallen von Sumatra, p. 31.

Flabellum rubrum var. *stokesii* GARDINER, 1902, Marine Investigations in South Africa, Vol. II, p. 131: GARDINER, 1906, Fauna and Geogr. Maldive, Laccadive Arch. II, p. 954: YABE and EGUCHI, 1933, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ., Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

There is almost no distinction between the specimen here figured and one figured of SEMPER's species which is, according to GARDINER and other authors, nothing but *F. stokesii.* Most of the species described by MILNE EDWARDS and HAIME from the Philippines as *F. debile, spinosum, aculeatum, owenii* and *stokesii* are regarded by GARDINER as the varietal forms of one and the same species for which the specific name *stokesii* is retained. *F. debile* which is a younger stalked form being the first described species in MILNE EDWARDS and HAIME's paper of 1848, the name properly to be applied to this subspecies is *F. rubrum debile* instead of *F. rubrum stokesii.* Evidently this subspecies is closely related to the typical species and there are many intermediate forms in our abundant specimens.

Distribution: Japan, Sôyô-maru St. 332 (Reg. No. 50890); St. 425; St. 457; Sititô-maru St. 3 (Reg. No. 58217); St. 7 (Reg. No. 58215). Intermediate forms, questionably assigned to this subspecies are obtained from the following localities; Sôyô-maru St. 222; St. 295 (Reg. No. 51220); St. 304 (Reg. No. 51210); St. 324; St. 325; off Tomioka, Amakusa Kamizima, Kumamoto-ken (Reg. No. 51212, 50228). Philippines (MILNE EDWARDS & HAIME, SEMPER, FAUSTINO). Maldives (GARDINER).

Fossil, Neogene of Taiwan (Formosa). Plio-Pleistocene of Ceram and Sumatra (UMBGROVE). Neogene of Sumatra (UMBGROVE). Miocene of Java (GERTH).

52) *Flabellum rubrum candeanum* (MILNE EDWARDS & HAIME).

Flabellum candeanum MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 278, pl. VIII, fig. 13: MILNE EDWARDS et HAIME, 1857, Hist. nat. cor., II, p. 95. v. MARENZELLER, 1888, Zool. Jahr. Syst. Geogr. Biol. Thiere, Bd. III.

The following is the original description of *P. candeanum* by MILNE EDWARDS and HAIME, in 1848.

"Polypier médiocrement comprimé à côtes latérales faisant un angle d'environ 45°, munies chacune de trois fortes épines dirigées en bas et en dehors, l'une près de la base, une autre vers le milieu de la hauteur ou un peu plus bas, et la troisième près du calice. Les côtes distinctes, assez larges, couvertes de stries en chevrons, avec un léger sillon médian longitudinal. Rapport des axes du calice, 100:180. Les sommets du grand axe en ogive, et sur un plan très peu inférieur à celui du petit axe. Fossette profonde. Cinq cycles de cloisons, le dernier incomplet, ne se montrant pas dans une des moitiés des systèmes moyens. Six systèmes; les cloisons secondaires égales aux primaires. Cloisons minces, un peu étroites, à grains des faces oblongs et trés espacés.

Hauteur, 15 mm; grand axe du calice, 18, petit, 10; profondeur de la fossette, 10; étendue de la plaie basilaire, 5. Habite la Chine (de Candé). Coll. ALCIDE D'ORBIGNY."

Among our rich material formerly assigned with doubt to *F. rubrum* and *F. rubrum debile,* some specimens are evidently referable to this form.

Dimensions (in mm):

Longer diameter of calice	16	14	13	12
Shorter diameter of calice	10	8	8	7
Height of corallum	15	10	8.5	8
Length of basal scar	6	6	7	6

The specimens measured above from the same haul evidently belong to the same species, notwithstanding a considerable individual variation in their height of corallum and the length of spines on the lateral costae. In all of them the costae and 'chevron'-shaped growth lines are distinctly marked, and descriptions given by MILNE EDWARDS and HAIME, and V. MARENZELLER pass precisely to our specimens. Usually in young individuals the epitheca is more or less incomplete at the calicular margin which is serrate due to the projected upper end of principal septa.

Distribution: Japan, off Asizuri-zaki, Kôti-ken; off Amakusa Islands, Kumamoto-ken. China sea (MILNE EDWARDS and HAIME). Indian Ocean (BOURNE).

53) *Flabellum crenulatum* MILNE EDWARDS & HAIME.

Flabellum crenulatum MILNE EDWARDS et HAIME, 1848, Monogr. Turb., p. 277.
Flabellum elegans MILNE EDWARDS et HAIME, 1848, loc. cit., p. 277.

The two species, *F. crenulatum* and *F. elegans*, were established by MILNE EDWARDS and HAIME on the specimens from unknown localities only slightly differring from one another in the size of basal scar. We have recently examined two specimens similar to *Fl. rubrum* in shape, but provided with straight radial costae and the upper margin of calicular wall strongly serrated as in *F. deludens*; these agree rather well with *Fl. crenulatum*, original description of which is quoted below:

"Polypier fortement comprimé, à plaie basilaire grande, portant de chaque côté un appendice comprimé, dirigé en bas et en dehors, et situé tout près de la base. Epithèque manquant en haut dans les intervalles des cloisons, d'où la forme de petites crénelures au bord supérieur de la muraille. Rapport des axes du calice, 100:254. Les sommets du grand axe anguleux, et situés vers le milieu de la hauteur de polypier. Fossette grande et profonde. La columelle comme dans le *F. profundum*. (Trabiculines columellaires très gros, subspiniformes:). Cinq cycles de cloisons; six systèmes, en apparence vingt-quatre. Les cloisons principales ayant leur bord interne coupé obliquement, épaissi et vermiculé. Les grains des faces saillants. Hauteur, 25 mm: grand axe du calice, 28; petit axe, 11; profondeur de la fossette, 10."

The only slight difference of our specimens from the original lies in the number of principal septa, these being twenty instead of twenty four in number and apparently in ternary arrangement in our specimens.

Distribution: Japan, off Seto, Wakayama-ken. (Reg. No. III, 16').

54) *Flabellum transversale* MOSELEY.

Flabellum transversale MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 174, pl. VI, figs. 6, 6a: YABE and EGUCHI, 1932, Proc. Imp., Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1933, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ. Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.
Flabellum dens ALCOCK, 1902, Siboga Exped. Monogr. XVIa, p. 32, pl. IV, figs. 30, 30a: FAUSTINO, 1927, Philippine Bur. Sci. Monogr. XXII, p. 59, pl. IV, figs. 6, 7.
Flabellum inconstans V. MARENZELLER, 1904, Valdivia Exped. VII, p. 277, pl. XVII, fig. 11.
Flabellum harmeri GARDINER, 1929, Brit. Mus., Nat. Hist. Rep. Zool., V, No. 4, p. 122, pl. I, figs. 19, 20.

The present species is also much variable as *Fl. rubrum* and evidently related to it, however, the former has its side or lateral costae more rounded without spines or tubercles and always is provided with a small cylindrical pedicle. *Fl. inconstans* V. MARENZELLER from the South Africa and *Fl. harmeri* GARDINER from near Great King Islands, New Zealand evidently fall in the range of variation of the present species.

Some specimens of this species resemble *Blastotrochus nutrix* which has a few small buds attached on both side of the lateral costae; in our specimens the buds are ease, to detach and remain probably only accidentally attached and never form branches as in colonial corals.

Distribution: Japan, Sôyô-maru St. 76 (Reg. No. 51004); St. 107; St. 130; St. 188 (Reg. No. 50818); St. 207 (Reg. No. 51215); St. 211; St. 220 (Reg. No. 39734); St. 259 (Reg. No. 50868); St. 271; St. 412; St. 420 (Reg. No. 51231); St. 425 (Reg. No. 50819); St. 438 (Reg. No. 50834); St. 444; St. 458; St. 462; St. 523; St. 523; St. 525 (Reg. No. 50869); St. 540; St. 628; St. 637; St. 639; St. 645 (Reg. No. 39729); Husa-maru St. 48 (Reg. No. 59052); St. 45 (Reg. No. 59098); St. 53 (Reg. No. 59059); Hukui-maru St. 3 (Reg. No. 59141); St. 4 (Reg. No. 59143); St. 6 (Reg. No. 51834); St. 9 (Reg. No. 59144); St. 14 (Reg. No. 59142). Philippines, 522 m (ALCOCK). Bass Strait, Australia, 38 fms (MOSELEY). Francis Bay, 100 m (v. MARENZELLER). Near Great King Islands, New Zealand, 100 m (GARDINER).

Fossil: Japan, Pliocene and Pleistocene of Tiba-ken, Kanagawa-ken; Ryûkyû limestone of Kikai-zima, Kagosima-ken. Tertiary of Australia (DENNANT).

55) *Flabellum transversale conicum* YABE and EGUCHI. Pl. XI(III), Fig. 18.

Flabellum transversale conicum YABE and EGUCHI, 1941, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ. Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2, pl. VII(III), figs. 8a–c, 10a–c.

Corallum subturbinate, slightly compressed; attached by a rather slender pedicle with more or less expanded base. Calicular fossa deep; septa 4 cycles in regular hexameral plan. At a glance, it resembles in the shape of corallum some species of *Caryophyllia* and *Balanophyllia*, but the resemblance is superficially restricted only to the outer shape of corallum. Younger specimen of *F. transversale* is more or less similar in several features, but easily distinguished from the subspecies *conicum* by having more compressed corallum and irregular arrangement of septa.

Distribution: Japan, Sôyô-maru St. 107 (Reg. No. 50895); St. 109; St. 130 (Reg. No. 51208); St. 259 (Reg. No. 50875); St. 271 (Reg. No. 50885); St. 412 (Reg. No. 39727); St. 465 (Reg. No. 39728); St. 468 (Reg. No. 50867); St. 549 (Reg. Nos. 50882, 50874); St. 553 (Reg. No. 50881); St. 638 (Reg. No. 50876). Tertiary of Geelong, Victoria, Australia (Reg. No. 50833).

56) *Flabellum deludens* v. MARENZELLER. Pl. XII(IV), Fig. 1.

Flabellum deludens v. MARENZELLER, 1904, Valdivia Exped., VII, p. 269, pl. XVII, fig. 10: VAUGHAN, 1907, U. S. Nat. Mus. Bull. 59, p. 63, pl. III, figs. 5a–b: GRAVIER, 1920, Rep. Camp. Sci. Monaco, Fasc. LV, p. 69, pl. VII, figs. 118–119: FAUSTINO, 1927, Philippine Bur. Sci. Monogr. XXII, p. 48, pl. II, figs. 7, 8: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 387: YABE and EGUCHI, 1933, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ. Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

Flabellum laciniatum ALCOCK, 1898, Deep-Sea Madreporaria. "Investigator," p. 21, pl. II, figs. 4, 4a.

Distribution: Japan, Sôyô-maru St. 11 (Reg. No. 59083); St. 109 (Reg. No. 59083); St. 113 (Reg. No. 50213); St. 118; St. 129; St. 188 (Reg. No. 50216); St. 191 (Reg. No. 50858); St. 192 (Reg. No. 50219); St. 205 (Reg. No. 50856); St. 210 (Reg. No. 50208); St. 222 (Reg. No. 50826); St. 223 (Reg. No. 50855); St. 255 (Reg. No. 50860); St. 301; St. 304 (Reg. No. 50205); St. 318 (Reg. No. 50215); St. 316 (Reg. No. 50204); St. 319 (Reg. No. 50096); St. 320 (Reg. No. 50207); St. 328 (Reg. No. 50218); St. 329 (Reg. No. 50202); St. 331 (Reg. No. 50206); St. 349 (Reg. No. 50201); St. 362; St. 388 (Reg. No. 50203); St. 220 (Reg. No. 50211); St. 312 (Reg. No. 50853); St. 416 (Reg. No. 50209); St. 421 (Reg. No. 43443); St. 423 (Reg. No. 50859); St. 425 (Reg. No. 50214); St. 437 (Reg. No. 50212); St. 459 (Reg. No. 50854); St. 523 (Reg. No. 50864); off Enosima, Kanagawa-ken (Reg. No. 59337); off Hatizyo-zima (Reg. No. 38200). Philippines, 19–502 fms (FAUSTINO). China Sea (Vicinity of Luzon, 102–172 fms; near Hongkong, 159–208 fms) (FAUSTINO). Sumatra, 614–660 m. (v. MAREN-

ZELLER). Indian Ocean, 400–600 fms (ALCOCK). Norwegian and North Atlantic seas (DUNCAN). Hawaiian Islands, 670–900 fms (VAUGHAN). Mediterranean Sea (GRAVIER).

Fossil: Miocene of Italy ?

57) *Flabellum japonicum* MOSELEY. Pl. XII(IV), Fig. 2.

Flabellum sp. MOSELEY, 1876, Proc. Roy. Soc. London, Vol. XXIV, p. 556.

Flabellum japonicum MOSELEY, 1881, Rep. Challenger, Zool. II, Vol. VII, p. 167, pl. VI, figs. 7a–c: v. MARENZELLER, 1888, Zool. Jahr. Syst. Geogr. Biol. Thiere, Bd. III, p. 45: ALCOCK, 1898, Deep-Sea Madreporaria. "Investigator," p. 23: ALCOCK, 1902, Siboga Exped., Monogr. Vol. XVIa, p. 32: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 47, pl. II, figs. 5–6: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 387.

Five large conical specimens are examined; they are rather limited in variation and quite like MOSELEY's original specimens, which are also from Japan.

Distribution: Japan, Sagami Bay, 345 fms (MOSELEY); off Omae-zaki, 565 fms (MOSELEY); Sôyô-maru St. 369 (Reg. No. 43447); St. 200 (Reg. No. 43444); off Usibuka, Amakusa islands, Kumamoto-ken, 119 m. According to FAUSTINO "the U. S. Nat. Mus. possesses a specimen from Japan, but we do not know the exact locality of that specimen". Philippines, 195–281 fms (FAUSTINO).

58) *Flabellum* cf. *apertum* MOSELEY. Pl. XII(IV), Fig. 3.

Compare:

Flabellum apertum MOSELEY, 1876, Proc. Roy. Soc. London, Vol. XXIV, p. 556: MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 167, pl. VI, fig. 7: v. MARENZELLER, 1904, Valdivia Exped., VII, p. 272: YABE and EGUCHI, 1941, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ. Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

The single specimen examined is more or less worn, but in its characteristic cup-shaped corallum with jagged-margin it closely resembles *F. apertum* from the South Indian Ocean and off Portugal

Distribution: Japan, Sôyô-maru St. 421 (Reg. No. 43443). South Indian Ocean (off Prince Edwards Islands, 310 fms) (v. MARENZELLER). Atlantic ocean (off Portugal, 900 fms Cape St. Vicent) (MOSELEY). East Africa (Pemba-canal, 818 m.) (v. MARENZELLER).

59) *Flabellum* cf. *multifore* GARDINER.

Flabellum multifore GARDLNER, 1904, Fauna and Geography of the Maldive and Laccadive Arch., II, p. 954, pl. XCIII, figs. 28, 29: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 57, pl. IV, figs. 1–2: YABE and EGUCHI, 1941, Fossil and Recent *Flabellum* from Japan. Sci. Rep., Tôhoku Imp. Univ., Sendai, 2nd Ser. (Geol.), Vol. XXII, No. 2.

A single fossil specimen was examined; it is more or less worn. Though it agrees well with *F. multifore* from the Philippines and Indian Ocean; however for specific identification better material is wanted.

Distribution: Indian Ocean, 24–97 fms (GARDINER). Philippines (FAUSTINO).

Fossil: Neogene of Taiwan (Formosa) (Reg. No. 41052).

Genus ***Rhizotrochus*** MILNE EDWARDS & HAIME, 1848

Rhizotrochus MILNE EDWARES et HAIME, 1848, Monogr. Turb., p. 281.

Genotype: *Rhizotrochus typus* MILNE EDWARDS & HAIME.

According to WELLS, *Rhizotrochus* is a synonym of *Monomyces* EHRENBERG.

60) *Rhizotrochus niinoi* YABE & EGUCHI, nov. Pl. XII(IV), Fig. 4.

Description given in Chapter IV.

Distribution: Japan, Hukui-maru St. 16 (Reg. No. 60820); St. 20; St. 28; off Misaki, Kanagawa-ken (76–104 m, bottom sandy).

Madreporaria Fungida MILNE EDWARDS & HAIME

Family Fungiidae DANA

Genus *Fungia* LAMARCK, 1801

Fungia LAMARCK, 1801, Syst. Anim., p. 369.

Genotype: *Fungia fungites* (LINNAEUS).

61) *Fungia* sp. (aff. *Fungia distorta* MICHELIN, 1843).

We have examined some ten small specimens (*Diaseris*-form). In the general characteristics they agree well with *Diaseris distorta* MICHELIN, but more delicately built and smaller in size.

Distribution: Japan, Sôyô-maru St. 9 (Reg. No. 60419); St. 253 (Reg. No. 60432); St. 336 (Reg. No. 56565). 248–522 m.

Genus *Bathyactis* MOSELEY, 1881

Bathyactis MOSELEY, 1881, Rep. Challenger, Zool. II, Vol. VII, p. 185.

Genotype: *Bathyactis symmetrica* (POURTALÈS)

62) *Bathyactis symmetrica* (POURTALÈS).

Bathyactis symmetrica MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 186, pl. XI, figs. 1–13a: JOURDAN, 1895, Zoanthaires provenant des campagnes du yacht l'Hirondelle., p. 28: ALCOCK, 1898, Deep-Sea Madreporaria "Investigator," p. 28: ALCOCK, 1902, Siboga Exped. Monogr., Vol. XVIa, p. 37: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 213: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 387.

Among many specimens examined, there are some irregularly shaped forms which correspond to *Diaseris*-form of *Fungia* sp. mentioned above. *Diaseris*-form of *Bathyactis* is also formed of repaired or regenerated, overlapping discs just like that of *Fungia*. Corallum of the normal form is thin and fragile; in other characteristics it agrees well with typical specimens dealt with by MOSELEY. According to this author, many specimens were secured by the "Challenger" Expedition from all the oceans, ranging from 32 fms to 2900 fms in depths. The size varies from 1 to 7 mm in diameter. It is highly probable that some young specimens of the other species of *Bathyactis* were merged with, as the younger forms of some species of *Bathyactis* are characterized by having fewer cycle of septa.

In our study of *Bathyactis kikaiensis* YABE & EGUCHI, we have examined that its young specimens are almost indistinguishable from those of the present species.

Distribution: Japan, Sôyô-maru St. 259 (Reg. No. 58948); St. 283 (Reg. No. 58950); St. 293 (Reg. No. 58951); St. 420; East of Japan, 2300–2900 fms (MOSELEY). In all oceans, ranging from 32 fms to 2900 fms.

63) *Bathyactis palifera* ALCOCK. Pl. XII(IV), Fig. 5.

Bathyactis palifera ALCOCK, 1902, Siboga Exped. Monogr., Vol. XVIa, p. 38, pl. V, figs. 34, 34a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 214, pl. LXXI, figs. 1–2; YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 387.

In every respect the figured specimen agrees with ALCOCK's original.

Distribution: Japan, Sôyô-maru St. 220 (Reg. No. 58909); St. 325 (Reg. No. 58912); St. 301 (Reg. No. 59100); St. 303; St. 412 (Reg. No. 58913); St. 418; St. 420 (Reg. No. 58907); St. 438 (Reg. No. 59087); Husa-maru St. 44 (*Diaseris*-form, Reg. No. 59050). Philippines (Southern end of Sulu Sea, 350 m) (ALCOCK), Molucca Islands, 141 m (ALCOCK).

64) *Bathyactis kikaiensis* YABE & EGUCHI. Pl. XII(IV), Figs. 6, 7.

Bathyactis kikaiensis YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Description in Chapter IV.

Distribution: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 50097).

Madreporaria perforata MILNE EDWARDS & HAIME

Family Stephanophylliidae YABE & EGUCHI, 1934

Micrabaciidae WELLS, 1933, Bull. Amer. Pal., Vol. XVIII, No. 67, p. 148.
Stephanophyllidae YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 281.

Genus *Stephanophyllia* MICHELIN, 1841

Stephanophyllia MICHELIN 1841, Dict. Sci. Nat., Suppl. I, p. 484 (After MICHELIN 1843).

Genotype: *Stephanophyllia elegans* MICHELIN.

65) *Stephanophyllia fungulus* ALCOCK.

Stephanophyllia fungulus ALCOCK, 1902, Siboga Exped. Monogr., Vol. XVIa, p. 40, pl. V, figs. 35, 35b: FAUSTINO, 1927, Philippine Bur. Sci., Monogr XXII, p. 245, pl. LXXVII, figs. 9–11: YABE and EGUCHI, 1932, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XV, No. 2, p. 60, pl. VIII, figs. 1–6c, pl. IX, figs. 1–8c: YABE and EGUCHI, 1932, Proc. Imp. Acad., VIII, No. 9, p. 443: YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 278.

Distribution: Japan, Sôyô-maru St. 445 (Reg. No. 59041); St. 298 (Reg. No. 60404); Husa-maru St. 45 (Reg. No. 59041); St. 42 (Reg. No. 59046). Sulu Sea, 450 m (ALCOCK).

Fossil: Japan, Neogene and Pleistocene of Tiba-ken (Reg. No. 60408); Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 38288).

Subgenus *Letepsammia* YABE & EGUCHI, 1932

Letepsammia YABE and EGUCHI, 1932, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XV, No. 2, p. 58.

Subgenotype: *Stephanophyllia formosissima* MOSELEY.

66) *Stephanophyllia* (*Letepsammia*) *formosissima* MOSELEY, 1881.

Stephanophyllia formosissima MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 201, pl. IV, fig. 11, pl. XIII, figs. 6–7, pl. XVI, figs. 8–9: ALCOCK, 1902, Siboga Exped. Monogr., Vol. XVIa, p. 39: VAUGHAN, 1907, U. S. Nat. Mus. Bull. 59, p. 146, pl. XLIV, figs. 2–2a: VAUGHAN, 1919, Ann. Rep. Smithsonian Inst., 1917, pl. XIV. figs. 4, 4a: FAUSTINO, 1927, Philippine Bur. Sci., Monogr XXII, p. 244, pl. LXXVII, figs. 7–8: YABE and EGUCHI, 1932, Sci. Rep., Tôhoku Imp. Univ., 2nd Ser. (Geol.), Vol. XV, No. 2, p. 61, pl. VIII, figs. 7–8: YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 281.

After the publication of our first paper, several additional materials of the present speciens are obtained; they are all in good state of preservation.

Distribution: Japan, Sôyô-maru St. 107 (Reg. No. 60430); St. 209 (Reg. No. 60423); St. 179 (Reg. No. 60696); St. 239 (Reg. No. 60428); St. 270 (Reg. No. 60429); St. 280 (Reg. No. 60433); St. 288 (Reg. No. 60694); St. 293 (Reg. No. 60427); St. 324 (Reg. No. 60426); St. 370; St. 429 (Reg. No. 60695); St. 431; St. 455 (Reg. No. 60434); St. 462 (Reg. No. 60431);

Husa-maru St. 45 (Reg. No. 59042); St. 85. Philippines, 95 fms, 522 m (ALCOCK, MOSELEY). East Indies (ALCOCK). Hawaiian Islands (VAUGHAN).

Fossil: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60421).

67) *Stephanophyllia* (*Letepsammia*) *japonica* YABE & EGUCHI. Pl. XII(IV), Fig. 8.

Stephanophyllia japonica YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443 (Nom. nud.): YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 281, figs. 1–3.

Description in Chapter IV.

Distribution: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 50236).

Family **Eupsammidae** MILNE EDWARDS & HAIME

Genus ***Endopachys*** LONSDALE, 1845

Endopahys LONSDALE, 1845, Quart, Jour. Geol. Soc., I, p. 54.

Genotype: *Endopachys maclurii* (LEA).

68) *Endopachys japonicum* YABE & EGUCHI.

Endopachys japonicum YABE and EGUCHI, 1932, Jap. Jour. Geol. Geogr., Vol. X, Nos. 1–2, p. 14, pl. II, figs. 1–6: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 367.

Distribution: Japan, Sôyô-maru St. 293 (Reg. No. 58988); St. 307 (Reg. No. 58989); St. 316; St. 317 (Reg. No. 58999); St. 332 (Reg. No. 59000); St. 220; St. 352 (Reg. No. 58987); St. 362 (Reg. No. 58985); Husa-maru St. 54 (Reg. No. 59043). Fossil: Japan, Pliocene and Pleistocene of Tiba-ken; Byoritu beds (Pliocene) of Taiwan; Ryûkyû limestone of Kikaizima, Ôsima-gun, Kagosima-ken (Reg. No. 58986).

69) *Endopachys grayi* MILNE EDWARDS & HAIME.

Endopachys grayi MILNE EDWARDS et HAIME, 1848, Monogr. Eupsammides, p. 82, pl. I, figs. 2, 2a: MILNE EDWARDS et HAIME, 1857, Hist. nat cor., II, p. 99: SEMPER, 1872, Zeit. Wiss. Zool. Bd. XXII, p. 267: V.D.HORST, 1922, Siboga Exped., Monogr., Vol. XVIc, p. 68: V.D.HORST, 1926, Trans. Linn. Soc. Lond. Zool., Vol XIX, p. 51; FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XXII, p. 240, pl. LXXVII, figs. 1–2: V.D.HORST, 1931, Rec. Ind. Mus., Vol. XXXIII, pt. 1, p. 11.

Distribution: Japan, off Seto, Wakayama-ken (Reg. Nos. 24, 25). Indian Ocean, 69–141 m. Philippines.

Genus ***Balanophyllia*** SEARLES WOOD, 1844

Balanophyllia WOOD, 1844, Ann. Mag. Nat. Hist., XIII, p. 11.

Genotype: *Balanophyllia calyculus* WOOD.

70) *Balanophyllia gigas* BRÜGGEMANN.

Balanophyllia gigas BRÜGGEMANN (M.S.); MOSELEY, 1881, Reg. Challenger, Zool., II, Vol. VII, p. 190: V.D. HORST, 1922, Siboga Exped., Monogr, Vol. XVIc, p. 52, pl. VIII, fig. 22: EGUCHI, 1934, Jour. Geol. Soc. Tokyo, Vol. XLI, p. 368.

V.D. HORST described this species in detail based on material from Japan. Several specimens from the Japanese waters now at disposal are safely assignable to this species, while several smaller ones are similar to *B. cornu* MOSELEY which is rather insufficiently known. Simple younger forms bear a certain resemblance to *B. imperialis* KENT and to some species of *Eupsammia*.

Distribution: Japan, Sôyô-maru St. 107 (Reg. No. 58943); St. 210 (Reg. No. 58936); St. 211 (Reg. No. 58941); St. 212 (Reg. No. 58981); St. 220 (Reg. No. 58945); St. 222 (Reg. No. 58944); St. 266 (Reg. No. 58982); St. 352 (Reg. No. 58941); St. 410 (Reg. No. 58939); St. 412 (Reg. No. 58980); Husa-maru St. 45 (Reg. No. 59037); off Misaki, Kanagawa-ken (Reg. No. 43411); off Enosima, Kanagawa-ken (Reg. No. 59341). Japan (V.D. HORST, MOSELEY). East Indies (Near Kei Islands, 90 m) (V.D. HORST).

71) *Balanophyllia ponderosa* VAN DER HORST. Pl. XII(IV), Fig. 9.

Balanophyllia ponderosa V.D. HORST, 1926, Trans. Linn. Soc. London, XIX, pt. 1, p. 10, pl. III, figs. 6, 7.

Distribution: Japan, Sôyô-maru St. 429 (Reg. No. 58991); off Seto, Wakayama-ken, (Reg. No. III, 63). Indian Ocean (Maldives, Mahlos atoll, Amiante, 29 fms) (V.D. HORST).

72) *Balanophyllia* cf. *italica* (MICHELIN). Pl. XII(IV), Fig. 10.

Caryophyllia italica MICHELIN, 1841, Icon. Zooph., p. 46, pl. IX, fig. 15.
Balanophyllia italica MILNE EDWARDS et HAIME, 1848, Monogr. Eupsammides, p. 86: MILNE EDWARDS et HAIME, 1860, Hist. nat. cor., III, p. 101: FROMENTEL, 1858–61, Introduction à l'étude de polypiers fossiles, p. 244: SEGUENZA, Atti R. Acad. dei Lincei 1879–80, Ser. III, CL, sc. fis. mat. e. nat., Vol. VI, p. 303: ORTMANN, 1890, Zeit. wiss. Zool. Bd. L, p. 284: DE ANGELIS, 1894, R. Accad. dei Lincei Ser. 5a, Mem. CI. di sc. fis. mat. e nat. 1, p. 35: v. MARENZELLER, 1904, Valdivia Exped., VII, p. 95, pl. XVII, fig. 22: V.D.HORST, 1622, Siboga Exped. Monogr., Vol. XVIc, p. 64 (with synonym: V.D.HORST, 1926, Trans. Linn. Soc. London, XIV, 1, p. 49: FELIX 1927, Anthozoa miocaenica, Foss. Cat. 1, Anim., Pars 35, p. 380: FELIX, 1929, Anthozoa Pliocaenica et Plistocaenica, Foss. Cat. 1, Anim: Pars 44, p. 563: EGUCHI, 1934, Jour. Geol. Soc. Tôkyo, Vol. XLI, p. 368.

In the present collection there are only two specimens shaped like *B. italica* in general aspect; these, however have principal septa of entire upper margin, but others of the higher cycles all serrated irregularly: otherwise they agree fairly well with the typical species. According to DÖDERLEIN, *B. verrucaria* (PALLAS) is a synonym of the present species. *B. desmophylloides* VAUGHAN from the Hawaiian waters is another ally, but it is more compressed. *B. cumingii* from the Philippines is also a similar one, though with principal septa less developed; according to V.D. HORST and V. MARENZELLER, is synonymous with *B. affinis* SEMPER. The last mentioned species is represented in our collection, but it distinctly differs from the present form in several characteristics.

Distribution: Sôyô-maru St. 638 (Reg. No. 59025); St. 647 (Reg. No. 59163). East Indies (Sapeh Strait, 69 m) (V.D. HORST). Indian Ocean (Maldives) (V.D. HORST). Red Sea (V. MARENZELLER). Mediterranean Sea (MILNE EDWARDS and HAIME, LACAZE-DUTHIER, DÖDERLEIN).

Fossil: Pliocene of Asti, Italy. Miocene of Monthelan, Dept. Indre-et-Loire (MICHELIN).

73) *Balanophyllia affinis* (SEMPER). Pl. XII(IV), Figs. 11, 12.

Rhodopsammia socialis SEMPER, 1872, Zeit. Wiss. Zool., Bd., XXII, p. 260, pl. XX, figs. 1–4: v. MARENZELLER 1907, Denk. K. Ak. Wiss. Math.-w. Wien, Bd. LXXXVII, pp. 5–6.
Rhodopsammia dubia SEMPER, 1872, loc. cit., p. 264, pl. XIX, fig. 10.
Rhodopsammia affinis SEMPER, 1872, loc. cit., p. 261, pl. XIX, fig. 7.
Rhosopsammia incerta SEMPER, 1872, loc. cit., p.264, pl. XIX, fig. 8.
Rhodopsammia ovalis SEMPER, 1872, loc. cit., p. 262, pl. XIX, fig. 9.
Balanophyllia affinis V.D.HORST, 1922, Siboga Exped. Monogr., Vol. XVIc, p. 63: V.D.HORST, 1926, Trans. Linn. Soc. London, XIX, pt. 1, p. 48: FAUSTINO, 1927, Philippine Bur. Sci., Monogr. XX, p. 228, pl. LXXV, figs. 1–12: V.D.HORST, 1931, Rec. Ind. Mus., Vol. XXXIII, pt. 1, p. 10.

The variation of this species is rather extensive; according to V. MARENZELLER, all the forms once assigned by SEMPER to different species as cited in the above list of synonyms belong to one and the same species. The genus *Rhodopsammia*, according to V.D. HORST, is a synonym of *Balanophyllia* and the specific name *socialis* is also preoccupied by another species of *Balanophyllia*.

Our specimens are mostly simple and have rather large encrusting base; otherwise they agree well with the present species.

Distribution: Sôyô-maru St. 239 (Reg. No. 58996); St. 240 (Reg. No. 59023); St. 293 (Reg. No. 59024); St. 429 (Reg. No. 59022); St. 549 (Reg. No. 59158). China Sea (SEMPER). Philippines, 6–30 fms (SEMPER). East Indies (Buton strait, 75–84 m) (V.D. HORST). Near Kei Islands, 245 m), Indian Ocean (Amirante, 28–32 fms; Seychelles, 34–37 fms; Ceylon, 6–34 fms; Palk strait, 6–7 fms; Cape Nigrais, Burma, 40–49 fms) (V.D. HORST).

74) *Balanophyllia* cf. *cumingii* MILNE EDWARDS & HAIME. Pl. XII(IV), Fig. 13.

Compare:

Balanophyllia cumingii MILNE EDWARDS et HAIME 1848, Monogr. Eupsammides, p. 87, pl. I, fig. 8: MILNE EDWARDS et HAIME, 1860, Hist. nat. cor., III, p. 104: BOURNE, 1905, Rep. Pearl Oyster Fisheries, Suppl. Rep. No. XXIX, p. 209: BEDOT, 1907, Rev. Suisse Zool., Vol. XV, p. 233, pl. XXXVI: V.D. HORST, 1922, Siboga Exped., Monogr., Vol. XVIc, p. 63.

According to BOURNE the calice of this species is similar to that of *Rhodopsammia ovalis* SEMPER, which is according to REHBERG, is conspecific with *Eupsammia stimpsoniana* VERRILL.

The figured specimen (Pl. XII(IV), Fig. 13) agrees in every respect well with the original figure of *B. cumingii* from the Indian Ocean, but is slightly larger than MILNE EDWARDS and HAIME's from the Philippines. The present specimen was dredged up in the same haul with *Balanophyllia affinis* SEMPER.

Distribution: Japan, Zenisu-gyosyô, near Izu seven Islands; Sôyô-maru St. 429 (Reg. No. 58236). Philippines (MILNE EDWARDS and HAIME, FAUSTINO). East Indies (Amboina (BEDOT), Kei Islands, 52 m (V.D. HORST)). Indian Ocean (Ceylon) (BOURNE).

Fossil: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken.

75) *Balanophyllia fistula* ALCOCK. Pl. XII(IV), Figs. 14, 15, 16.

Balanophyllia (*Thecopsammia*) *fistula* ALCOCK, 1902, Siboga Exped., Monogr., Vol. XVIa, p. 42, pl. V, figs. 36a: V. MARENZELLER, 1907, Denk. K. Ak. Wiss. Math.-Nat. Wien, Bd. LXXX, p. 16, pl. I, figs. a–f: V.D.HORST, 1922, Siboga Exped., Monogr., Vol. XVIc, p. 59: FAUSTINO, 1927, Philippine, Bur. Sci., Monogr. XXII, p. 222, pl. LXXII, figs. 5–6.

ALCOCK and V. MARENZELLER's descriptions of this species are quite adequate; it is represented by many specimens in our material. Among them two forms are distinguishable, one is characterized by having well developed epitheca and the others by lacking it and bearing distinct costae; the latter usually has many buds, which are usually fastened with their base to the parent corallites and having an appearance of a branching colony. Younger specimens are usually subcylindrical, very gradually taper towards the pointed base, and have epitheca thickly developed except at the calicular margin. Three forms are figured in the accompanying plates.

Distribution: Japan, Sôyô-maru St. 444 (Reg. No. 58928); St. 420 (Reg. No. 58934); St. 412 (Reg. No. 58933); St. 352 (Reg. No. 59169); St. 333 (Reg. No. 59172); St. 330 (Reg. No. 59172); St. 327 (Reg. No. 59171); St. 316 (Reg. No. 58971); St. 293 (Reg. No. 58972); St. 283 (Reg. No. 59170); St. 271 (Reg. Nos. 58965, 58964); St. 232 (Reg. No. 58970); St. 219 (Reg. No. 58968); St. 210 (Reg. No. 58962); St. 222 (Reg. Nos. 59167, 58975); St. 220 (Reg. No. 59168); St. 179 (Reg. No. 58966); St. 107 (Reg. No. 58961); off Hamazima, Sima-gun, Mieken (Reg. No. 60392); Sititô-maru St. 6 (Reg. No. 58239); St. 7 (Reg. No. 58233); St. 10 (Reg. No. 58234); Hukui-maru St. 8 (Reg. Nos. 59152, 51833). Philippines, 270–275 m (ALCOCK). East Indies (Borneo-bank, 34 m; Kei-islands, 90 m; Sapeh-Strait, 73 m) (V.D. HORST). Red Sea (V. MARENZELLER).

Fossil: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. Nos. 60741, 60739).

76) *Balanophyllia rediviva* MOSELEY. Pl. XII(IV), Figs. 17, 18.

Balanophyllia rediviva MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 193, pl. XV, figs. 10–12: v. MARENZELLER, 1907, Denk. K. Ak. Wiss. Math.-Nat. Wien, Bd. LXXX, p. 14, pl. II, figs. 1, 1a: v.D. HORST, 1922, Siboga Exped., Monogr., Vol. XVIc, p. 59.

Balanophyllia rediviva MOSELEY was originally established by MOSELEY based on the specimens of the Challenger Expedition from off Kei Islands, the species is more or less similar in shape to *Parasmilia fecunda* POURTALÈS, but the similarity is only in the shape of corallum. The original specimen described by MOSELEY has no lateral buds, while v. MARENZELLER recorded a large tortuous corallum with three lateral buds of this species from the Red Sea.

We have examined some 12 specimens which are similar to v. MARENZELLER's specimen; most of them have more than three buds and parental corallum more elongated. *Dendrophyllia serpentina* VAUGHAN from the Hawaiian water is another species similarly characterized.

Balanophyllia fistula is a species much slender than, otherwise closely resembling this species.

Distribution: Japan, Sôyô-maru St. 16 (Reg. No. 58976); St. 109; St. 179 (Reg. No. 58979); St. 212 (Reg. No. 58931); St. 211 (Reg. No. 58977); St. 222 (Reg. No. 58935); St. 325 (Reg. No. 58973); St. 438 (Reg. No. 58978); Husa-maru St. 45 (Reg. No. 59035). East Indies (MOSELEY). Red Sea (v. MARENZELLER).

77) *Balanophyllia diomedae* VAUGHAN.

Balanophyllia diomedae VAUGHAN, 1907, U. S. Nat. Mus., Bull. 59, p. 151, pl. XLV, figs. 3–5.

Two small cylindrical specimens are assigned to this species; VAUGHAN's original description is also well applicable to them.

Distribution: Japan, Sôyô-maru St. 244 (Reg. No. 59027); St. 266 (Reg. No. 29026). Hawaiian Islands (VAUGHAN).

78) *Balanophyllia* cf. *hawaiensis* VAUGHAN. Pl. XII(IV), Fig. 20.

Compare with:

Balanophyllia hawaiensis VAUGHAN, 1907, U. S. Nat. Mus., Bull. 59, p. 148, pl. XLIV, figs. 4–5.

A single specimen from the St. 429 is slightly more compressed than the typical specimen of this species, otherwise it quite well agrees with the VAUGHAN's original description. Dimensions: longer diameter of calice 15 mm, lesser diameter of calice 13 mm, diameter of base 5 mm, height of corallum 29 mm.

Distribution: Japan, Sôyô-maru St. 429 (Reg. No. 58994). Hawaiian Islands (VAUGHAN).

Besides the above mentioned species, we have examined many different forms of the genus *Balanophyllia*, some of them may probably constitute new species, but mostly being represented by single, worn specimen; their description are left for another occasion.

Genus ***Heteropsammia*** MILNE EDWARDS & HAIME, 1848

Heteropsammia MILNE EDWARDS et HAIME, 1848, Monogr. Eupsammides, p. 89.

Genotype: *Heteropsammia michelinii* MILNE EDWARDS & HAIME.

79) *Heteropsammia michelinii* MILNE EDWARDS & HAIME.

Heteropsammia michelinii MILNE EDWARDS et HAIME, 1848, Monogr. Eupsammides, p. 89: MILNE EDWARDS et HAIME, 1860, Hist. nat. cor. III, p. 106: SEMPER, 1872, Zeit. Wiss. Zool., Bd. XXII, p. 264, pl. XIX, figs. 5–9: MOSELEY, 1881, Rep. Challenger, Zool., II, Vol. VII, p. 172: v.D.HORST, 1922, Siboga Exped., Monogr., Vol. XVIc, pt. 3, p. 66, pl. VIII, fig. 7: FAUSTINO, 1927, Philippine Bur. Sci., Monogr., XXII, p. 235, pl. LXXVI, figs. 1–6: HAYASAKA, 1931, Taiwan Tigaku Kizi, Vol. II, No. 5–8, p. 68; YABE and EGUCHI, 1932, Jap. Jour. Geol. Geogr., Vol. X, Nos. 1–2, p. 21, pl. III, figs. 1–5.

Distribution: China Sea (MILNE EDWARDS and HAIME). Philippines, 12–60 m (SEMPER, MOSELEY, FAUSTINO). East Indies, 22–75 m (V.D. HORST). Indian Ocean (BOURNE).

Fossil: Japan, Mud volcano of Taiwan (Reg. No. 41049).

80) *Heteropsammia cochlea* (SPENGLER).

Madrepora cochlea SPENGLER, 1841, Beskrivelse over at ganske besonderligt Corall. prodeskt. Neue Samm-ling of det Danske videnskabenes Selskabs Skrifte, t. I, p. 240, figs. a–c.
Heterocyathus cochlea GRAY, 1850, Ann. Mag. N. H. Ser. 2, Vol. V, p. 410.
Heteropsammia rotundata SEMPER, 1872, Zeit. Wiss. Zool., Bd. XXII, p. 265, pl. XX, figs. 10a–b: ALCOCK, 1893, Jour. Asiatic Soc. Bengal, Vol. LXII, pt. 2, p. 30.
Heteropsammia cochlea MILNE EDWARDS et HAIME, 1860, Hist. nat. cor., III, p. 106: V.D.HORST, 1922, Siboga Exped., Monogr., Vol. XVIc, p. 66: FAUSTINO, 1927, Philippines Bur. Sci., Monogr. XXII, p. 236, pl. LXXVI, figs. 7–8: YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Three recent specimens are examined, they agree in every respect with the original description of this species.

Distribution: Japan, Sôyô-maru St. 395 (Reg. No. 56061); St. 465 (Reg. No. 56062). Philippines (Bohol, 25 fms) (SEMPER). East Indies, 15–83 m (V.D. HORST).

81) *Heteropsammia cochlea alta* YABE & EGUCHI.

Heteropsammia cochlea var. *alta* YABE and EGUCHI, 1932, Jap. Jour. Geol. Geogr., Vol. X, nos. 1–2, p. 25, pl. III, figs. 14–19.

Fossil: Japan, Byôritu beds of Taiwan (Reg. Nos. 41050, 39204).

82) *Heteropsammia ovalis formosensis* YABE & EGUCHI.

Heteropsammia ovalis var. *formosensis* YABE and EGUCHI, 1932, Jap. Jour. Geol. Geog. Vol. X, Nos. 1–2, p. 23, pl. III, figs. 6–13.

Fossil: Japan, Byôritu beds of Taiwan (Reg. Nos. 38193, 41048).

83) *Heteropsammia ovalis japonica* YABE & EGUCHI. Pl. XII(IV), Fig. 21.

Heteropsammia ovalis var. *japonica* YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Description see Chapter IV.

Fossil: Japan, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60748).

Genus ***Rhizopsammia*** VERRILL, 1869

Rhizopsammia VERRILL, 1869, Trans. Conn. Acad., Vol. I, p. 510.

Genotype: *Rhizopsammia pulchra* VERRILL.

84) *Rhizopsammia minuta mutsuensis* YABE & EGUCHI.

Rhizopsammia minuta var. *mutsuensis* YABE and EGUCHI, 1932, Sci. Rep., Tôhoku Imp. Univ., Ser. 4 (Biol.), Vol. VII, No. 2, p. 208, pl. LX, figs. 1–3: ABE, N., 1939, Jubilee Publ. Comm. Prof. H. YABE, M. I. A. Sixtieth Birthday, Vol. I, p. 175.

Distribution: Japan, Mutu Bay (Reg. No. 41391). Shallow water.

IV. DESCRIPTION OF NEW OR NOT YET FULLY DESCRIBED SPECIES

The following is the list of the species described below.

1. *Desmophyllum delicatum* YABE & EGUCHI, nov.
2. *Fragilocyathus conotrochoides* YABE & EGUCHI, 1932.
3. *Cyathoceras niinoi* YABE & EGUCHI, nov.
4. *Ceratotrochus hiugaensis* YABE & EGUCHI, nov.
5. *Ceratotrochus* (*Conotrochus*) *parahispidus* YABE & EGUCHI, nov.

6. *Ceratotrochus (Conotrochus) elongatus* YABE & EGUCHI, nov.
7. *Placotrochides? kikutii* YABE & EGUCHI, 1941.
8. *Caryophyllia scobinosa decapali* YABE & EGUCHI, nov.
9. *Caryophyllia paucipaliata* YABE & EGUCHI, nov.
10. *Caryophyllia paraoctopali* YABE & EGUCHI, nov.
11. *Premocyathus compressus* YABE & EGUCHI, nov.
12. *Goniocyathus pacificus* YABE & EGUCHI, 1932.
13. *Trochocyathus (Tropidocyathus) wellsi* YABE & EGUCHI, nov.
14. *Trochocyathus (Thecocyathus) hanzawai* YABE & EGUCHI, nov.
15. *Rhizotrochus niinoi* YABE & EGUCHI, nov.
16. *Bathyactis kikaiensis* YABE & EGUCHI, nov.
17. *Stephanophyllia (Letepsammia) japonica* YABE & EGUCHI, 1934.
18. *Heteropsammia ovalis japonica* YABE & EGUCHI, nov.

Desmophyllum delicatum YABE & EGUCHI, nov.

Pl. IX(I), Figs. 7a, 7b.

Corallum thin and fragile; conical or subturbinate, attached with a small cylindrical stalk, truncated above. Calice ovate, calicular fossa narrow, cleft-like, deep. Septa extremely delicate, most of them usually projecting much into the calicular center, upper margin straight, almost in a plane with the border of calice, minutely granulated on lateral faces; 48 in number, arranged in 4 cycles in hexameral plan. Septa of the first two cycles equal in size, being longest of all, with their vertical inner margin outlining central cleft-like calicular fossa; 12 septa of the third cycle little shorter than the former, but longer than those of the last cycle. Septa of the higher cycles usually undulated laterally. Wall thin, faintly costate; costae alternating in size and corresponding to septa, thinner costae only visible under the magnifier. No columella, nor endotheca; pali absent.

Dimensions (in mm.):

Longer diameter of calice	19
Shorter diameter of calice	16
Height of corallum	21

Remarks: The present species is based on a single young specimen, but it can easily be distinguished from all the previously known species of *Desmophyllum* by its delicate texture of corallum and thin but well-developed septa. A young specimen of *D. dianthus* from Sagami Bay is likewise delicately built, but its corallum is more rounded and has principal septa more marked than the others and the septa close to the principals are higher than the preceeding ones.

Locality: Sôyô-maru St. 22 (Reg. No. 59131). (Type loc.)

Distribution: Japan, known only from the type locality.

Genus *Fragilocyathus* YABE & EGUCHI, 1932

Fragilocyathus YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389: VAUGHAN and WELLS, 1936, Check list of Generic Names applied to the Madreporaria Hexacoralla, p. 15.

Genotype: *Fragilocyathus conotrochoides* YABE & EGUCHI, 1932.

Diagnosis: "Turbinolid. Corallum simple, cylindro-conical, attached laterally near its pointed base upon septa of an older one (septal budding): fragile, showing a tendency easily to

split longitudinally. Epitheca relatively thick, calice circular, very deep. Septa fairly stout, not exsert, upper margin entire, inner margin free and dentated by irregularly spaced nodulous processes; arranged in hexameral plan and in 4 cycles, decreasing regularly in size from the older one to the younger."

Above is the original diagnosis of *Fragilocyathus,* which is now monotypic. *Conotrochus,* a subgenus of the genus *Ceratotrochus,* and *Aulocyathus* are two similar types and especially the latter is close to the present genus, having the characteristic septal budding and irregular large granules on the inner lower margin of septa in common with it; but they are provided with columella which is absent in ours.

Fragilocyathus conotrochoides YABE & EGUCHI, 1932

Pl. IX(I), Figs. 15a, 15b.

Fragilocyathus conotrochoides YABE and EGUCHI, 1932, Proc. Imp. Acad., VIII, No. 8, p. 390, fig. 2.

Corallum as described in the generic diagnosis.

The dimensions (in mm) of six specimens are given below.

Sôyô-maru St.	652	572	352	199	553	546
Reg. No.	50083*	53676	50084*	50085	53674	53675
Diameter of calice	8.5	8	6.5	6	6	6
Height of corallum	30	24	30	23	18	18
Number of septa	41	49	44	40	40	36

Remarks: As cited in the above list, the number of septa varies individually; usually the septa are in three different sizes, and the six septa of the first cycle are always distinguishable from those of the second by careful observation. The septa of the last cycle are much reduced in size and, sometimes, a few of them are still undeveloped. The granules on the inner margin of the septa are usually crowded. On the outer surface of corallum, there are fine vertical striations in addition to some rings or annules.

Localities: Sôyô-maru St. 199 (Reg. No. 50085); St. 259 (Reg. No. 53673); St. 352 (Reg. No. 50084),* (Type loc.); St. 546 (Reg. No. 53675); St. 553 (Reg. No. 53674); St. 572 (Reg. No. 53676), (Pl. IX(I), Fig. 15); St. 652 (Reg. No. 50083).*

Distribution: Japan, (Mostly from the Japan Sea, and a few from the Pacific coast of central Japan, 101–207 m).

Cyathoceras niinoi YABE & EGUCHI, nov.

Pl. IX(I), Figs. 9a, 9b.

Corallum conical or rather subturbinate, being broadest slightly below truncated calicular margin, not quite straight, slightly curving on shorter axis of calice; attached with rather small pedicle, which is expanded at base to form a large encrusting film. Almost cylindrical and snow-white near calicular margin, thence tapering rapidly downwards to pedicle; latter part occupying three-fourths of corallum dark coloured and covered by bryozoas and other shells; no costae, thickly granulated all over lateral surface where exposed. Calice oval, wall rather thick, and calicular fossa very deep around columella. Septa very slightly exsert, 96 in number, ar-

* Those marked with an asterisk are figured in our former paper (YABE and EGUCHI, 1932. Study of the Recent Deep-water Coral Fauna of Japan. Proc. Imp. Acad. Vol. VIII, No. 8, p. 390, fig. 1), in which the explanation of them was accidentally omitted. Fig. 1 in p. 390, shows two specimens, both are enlarged twice the natural size. One (Reg. No. 50084) is shown in both lateral and calicular views, and the other (Reg. No. 50083) represents a longitudinally splited one showing the vertical section of corallum, in which the septal margin and empty calicular fossa are clearly shown.

ranged in 5 complete cycles of hexameral plan; septa of first two cycles thick or stout, subequal in size, those of first cycle being distinguished from those of second only by close observation; upper margin acute, projecting inwardly about one-third of diameter. Septa of third cycle smaller and projecting less inwards, those of 4th and 5th cycles much shorter, and those of 5th always rudimentary, being visible only near wall. Columella oblong, formed of some 9 twisted ribbon-like plates arranged in two rows, short, occupying only basal parts of calicular fossa and quite separated from vertical inner margin of principal septa around it. No pali.

Dimensions (in mm):

Longer diameter of calice	15
Shorter diameter of calice	10.5
Height of corallum	20
Diameter of stalk	2

Remarks: The present species is based on a single specimen, in excellent preservation. It is easily distinguished from *Cyathoceras diomedae* and *Cyathoceras rubescens*, which are also represented in our collection, by having little exsert septa and a small pedicle; in the latter two species the septa are much exsert and the pedicle is large. The present species is similar to an Eupsammid coral, *Balanophyllia gigas* in shape and size of corallum, but the resemblance is only superficial.

Locality: Husa-maru St. 44 (off Taitô-zaki, Tiba-ken) (Reg. No. 59070).

Distribution: Japan, known only from the type locality.

Ceratotrochus hiugaensis YABE & EGUCHI, nov.

Pl. IX(I), Figs. 10a, 10b.

Corallum conical, straight, truncated above, with small pointed base; sometimes attached. Calice circular, fossa deep. Septa, thin and straight, slightly exsert; 48 in number, arranged in 4 cycles of regular hexameral plan; 12 septa of first two cycles subequal and about one-third long as diameter of calice, inner margin vertical and thin; 12 septa of third cycle smaller, but same in shape, septa of 4th cycle much shorter, thinner, and slightly projecting from calicular wall, all septa free in inner margin and covered laterally by small granules. No pali, nor endotheca. Calicular fossa large; columella small, quite independent from inner margin of septa and formed of 4 twisted, broad upright ribbons loosely fastened together. Wall naked, thin and not stretching to calicular margin, which appears more or less serrated by subequal outer margin of exsert septa. Costae indistinct; under the magnifier there are visible faint vertical striations which take place of intercostal grooves and are densely covered by low, minute granules; these striations are more distinct at lower two-thirds of corallum.

Dimensions (in mm):

St. No.	315	309	309
Reg. No.	50245	50246	50246
Diameter of calice	9	7	6.5
Height of corallum	9	8	6.5

Remarks: The above description is based on a single specimen from the Sôyô-maru Station 315 (Reg. No. 50245); the other two specimens measured above agree quite well with it in every feature; of the latter two, the smaller specimen is well costated, the costae being subequal and has the columella better developed than in the type-specimen.

The present species by having naked corallum and circular calice is easily distinguished from all the known species of *Ceratotrochus*, most of which are usually more or less compressed and crested with lateral costae.

Localities: Sôyô-maru St. 315 (Reg. No. 50245) (Type loc.); St. 309 (Reg. No. 50246).

Distribution: Japan, Pacific coast of Kyûsyû, 91–472 m.

Subgenus *Conotrochus* SEGUENZA, 1863

Conotrochus differs from the genus *Ceratotrochus* only by having well-developed epitheca, which is united in a characteristic manner with the wall.

Ceratotrochus (Conotrochus) parahispidus YABE & EGUCHI, nov.

Pl. IX(I), Figs. 12a, 12b.

Corallum conical, attached to a small base, usually more or less curved; wall thick, outside costated and covered by thin epitheca with broad rings of accretion. Calice circular, deep, surrounded by high wall. Septa hardly as elevated as sharply defined calicular margin, obtuse at upper margin, moderately thick and straight, 4 cycles in hexameral plan, 12 septa of first two cycles subequal and extending much inwards, but not reaching columella, which is quite independent from septa. Septa of 3rd cycle very thin and short; all septa descending deep into bottom of calicular fossa. Columella large, styliform, more or less ovate in cross section, formed of 10 or 12 broad twisted ribbon-like upright, strands fastened by trabecular process. No pali, nor endotheca. Epitheca and wall thickly coalesced to form a stout high wall.

Dimensions (in mm):

St. No. 323; Reg. No. ..	50247	"	"	"	"	"	"	"	59174
Diameter of calice	9.5	9.5	9.5	9.5	10.5	10.5	12	11	14
Height of corallum	14.5	16	17	17	19	22	18	21.5	23

Remarks: The description is based on the type-specimens, measured above. All of the specimens were obtained in one haul at the Sôyô-maru St. 323. In addition, some 12 specimens from several other stations are quite uniform in their characteristics; the smallest specimen is 8 mm broad, 12 mm high, and has 36 septa.

This species resembles closely *Conotrochus funicolumna* ALCOCK from the East Indies and Japan, but can be easily distinguished from it by having elongate conical corallum much less in calicular diameter.

Gardineria lili GARDINER from off New Zealand is another similar form, but the present species differs from it essentially by having regularly arranged septa.

In our preliminary work this species and *Conotrochus elongatus* YABE and EGUCHI, from the Ryûkyû limestone of Kikai-zima, described below were not specifically distinguished, but a closer study has revealed that the present species is more broadly conical than the other, being less high and having always broader calice; moreover, the general structure of corallum is coarser in this species than in the fossil one, and epitheca is much better developed in the former.

Although *Phloeocyathus hospes* ALCOCK and *Pleurocyathus brunneus* MOSELEY have some characteristics close to this species, they can be easily distinguished from it; these three species are apparently allied and may probably form a natural group.

Localities: Sôyô-maru St. 259; St. 252; St. 302 (Reg. No. 50249); St. 323 (Reg. Nos. 50247, 59174) (Type loc.); St. 343 (Reg. No. 50248); St. 356; St. 368 (Reg. No. 59015); St. 414 (Reg. No. 59014); St. 419 (Reg. No. 59016).

Distribution: Japan, (Pacific coast of Honsyû, Sikoku and Kyûsyû; East China Sea, coast of Kyûsyû, 88–600 m).

Ceratotrochus (Conotrochus) elongatus YABE & EGUCHI, nov.

Pl. IX(I), Figs. 13, 14.

Conotrochus elongatus YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Corallum elongate, cylindro-conical, or almost conical in full grown specimens; attached with bluntly pointed base of a small subcylindrical pedicle, sometimes on inner ends of some detached septa of the same species as in the case of *Fragilocyathus* and other allied genera; calice circular, moderately deep; wall epithecate, much varied in thickness, pericular wall formed of coalesced wall and epitheca elevated higher than upper margin of septa, thus giving rise at calicular margin an excavated zone between them. Costae indistinct; epitheca concentrically wrinkled, but faint striations corresponding to interseptal loculi still visible under accretions. Septa straight, rather thin, with sharp and entire margin, arranged in three complete cycles of hexameral plan, alternating in size. In a small specimen with 26 septa some 13 septa are subequal and extend to near columella, and the rest are smaller. In a larger specimen with 30 septa, 15 are larger and 15 smaller. Columella circular, formed of some 8–10 papillae, projecting at center of deeper calicular fossa. No pali. Septal faces minutely granulated.

Dimensions (in mm):

Specimen, No. Reg. No. 60759	No. 1	No. 2
Diameter of calice	5	4.5
Height of corallum	9	15
Number of septa	29	30

Remarks: The above description is based on five specimens, two of them are measured above. The thickness of septa and wall varies to some extent.

Conotrochus parahispidus is similar to the present species, but is, as stated afore, rather conical than cylindrical, and has a calice usually larger than 8 mm, while this is usually less than 5 mm in *elongatus*. Moreover, the latter species is characterized by irregularly arranged septa.

Conotrochus funicolumna is a much lower or depressed form, having the septa arranged in regular hexameral plan.

Locality: Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60757). (Type loc.)

Distribution: Japan, known only from the type locality.

Genus *Placotrochides* ALCOCK, 1902

Placotrochides ALCOCK, 1902, Siboga-Exped., Monogr., Vol. XVIa, p. 33: YABE and EGUCHI, 1941, Corals of Toyama Bay. Bull. Biogeogr. Soc. Japan. Vol. XI, No. 7, p. 40.

Genotype: *Placotrochides scaphula* ALCOCK.

As already stated in our former paper, the first species described by ALCOCK (*Pl. dentiformis*) may probably be a younger form of *Premocyathus compressus* YABE & EGUCHI. The following species slightly differs from the type species by having regular, straight sided and compressed corallum.

Placotrochides ? kikutii YABE & EGUCHI, 1941

Pl. IX(I), Figs. 16a, 16b, 16c.

Placotrochides ? kikutii YABE and EGUCHI, 1941, Corals of Toyama Bay. Bull. Biogeographical Soc. Japan, Vol. XI, No. 7, p. 40.

"Corallum small, somewhat compressed, columnar, truncated above, cuneiform at base, laterally costate; calice 3 × 1.5 mm in size; 3 mm high; upper 3/4 surrounded by vertical lateral faces bearing straight costae; lower 1/4 cuneiform rapidly attenuated to a thin linear basal edge and costated feebly. Septa 24 in number, 12 of first 2 cycles larger than others and each provided with a pali at inner margin; 12 septa of third cycle rudimentary; costae subequal, in alternate position with septa and separated by narrow furrows on the elongation of septa. Columella elongated, rather linear, evidently formed of minute papillae in a row and smaller than pali."

Remarks: Some six specimens of this species are examined: they are all of the same size, with some variations in the development of pali-form expansions of the inner margin of septa.

Placotrochides scaphula is a similar species, but in the present one the calices are regular, symmetrical, and spindle-shaped instead of being irregular, asymmetrical and ovate as in *P. scaphula,* and the inner ends of septa have pali-form expansions.

Locality: Japan, Toyama Bay. Coll. Mr. K. KIKUTI (Reg. No. 63088). (Type loc.)

Distribution: Japan, known only from the type locality.

Caryophyllia scobinosa decapali YABE & EGUCHI, nov.

Pl. X(II), Figs. 6, 7.

Corallum like *Caryophyllia scobinosa* ALCOCK in form and size, but differing from it by having pali and principal septa 10 in number instead of 12. Almost identical with *Caryophyllia quadrigenaria* ALCOCK from the East Indian Sea in the appearance and number of pali, but this species is usually attached by a cylindrical stalk. Some young specimens of the present subspecies are almost impossible to be distinguished from *C. quadrigenaria.*

The present subspecies is more common in Japan rather than the typical species.

Localities: Sôyô-maru St. 210 (Reg. No. 53640) (Type loc.); St. 220 (Reg. No. 53637); St. 222 (Reg. No. 53636); St. 293 (Reg. No. 53636); St. 329 (Reg. No. 53639); St. 439.

Distribution: Japan, (Pacific coast of Honsyû, Sikoku and west coast of Kyûsyû, 155–234 m).

Caryophyllia paucipaliata YABE & EGUCHI, nov.

Pl. X(II), Figs. 9, 10, 11.

Caryophyllia paucipaliata YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 433.

Corallum free, conical, usually more or less curved, pointed at base. Calice circular, moderately deep. Septa exsert, straight and not crowded, 43–44 in number, of which 11 septa are much exsert and extend to near columella, while other 11 are as long as about two-thirds, and the rest about one-half of principals; principal septa only slightly and all others rapidly thinning out towards inner free margin. Pali very thin and lamellar, usually 8 or 9 in number, standing opposite the septa secondly large in size. Columella small, lax, formed of few trabecles. In deeper bottom of calice, few septa second in size united in front of each principal one,

thus forming deltoid groups; extremely thin platy pali united by trabecular processes to columella. Costae well developed, subequal and straight, distinct throughout, broad, rounded, and covered by minute rounded granulations, which are arranged in 2 or 3 irregular rows.

Dimensions (in mm):

Reg. No. 60740; Specimen No.	1	2
Diameter of calice	11	8
Height of corallum	19	14
Principal septa, elevated above the upper margin of wall	1.5	1.5

Remarks: Some 230 specimens of the present species are examined; they are in varied growth stages, and vary in size in wide extent; two specimens are measured above. *Caryophyllia scobinosa* ALCOCK from the East Indies and Japan is most similar to the present species, but the latter is easily distinguished from the former by having well developed costae, thinner and fewer pali, and small, loose columella. On the other hand, *C. scobinosa* has well developed epitheca.

Locality: Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60740). (Type loc.)

Distribution: Ryûkyû limestone of Kikai-zima.

Caryophyllia paraoctopali YABE & EGUCHI, nov.

Pl. X(II), Figs. 12a, 12b.

Corallum attached with a rather stout pedicle and an encrusting base; subturbinate; surface covered by wrinkled epitheca, which consists, under the magnifier, of minute, concentric, discontinuous ridges and furrows parallel to calicular margin. Calice circular, rather shallow. Septa slightly exsert, 32 in number, alternating in size; 8 septa of first cycle most exsert and as long as about one-third of diameter, ending at more or less expanded and flexuous inner margin. 8 septa of second cycle somewhat shorter; 16 of the last cycle much thinner, extending about half way of primary septa, with free and thin inner margin. Pali also 8 in number, lying before the septa of second cycle. Columella papillate, formed of 3 or 4 small papillae.

Dimensions (in mm):

Reg. No.	53645	53647	53646
Diameter of calice	5	5.5	3
Diameter of pedicle	3	3	2
Depth of calicular fossa	2	2	2
Height of corallum	15	10	6

Remarks: The three specimens measured above evidently belong to a single species, which is almost similar to *C. octopali* VAUGHAN from the Hawaiian Sea but differing from it by subturbinate corallum with well developed epitheca. Similar wrinkled epitheca is known of *C. rugosa* MOSELEY and *C. lamellulosa* MOSELEY; both species have similarly-shaped corallum with ours, but they are characterized by having regular hexameral septa and pali (12 in number).

Localities: Sôyô-maru St. 285 (Reg. Nos. 53648, 53645); St. 294 (Reg. No. 53646); off Hosozima, Higasi-Usuki-gun, Miyazaki-ken, about 100 fms (Reg. No. 53647). Coll. EGUCHI. (Type loc.)

Distribution: Japan, (Pacific coast of Honsyû, Sikoku and Kyûsyû, 71–150 m).

Genus **Premocyathus** YABE & EGUCHI, nov.

Genotype: *Caryophyllia compressa* YABE and EGUCHI, 1932.

Diagnosis: Corallum simple, free, curved, compressed, indistinctly costate, and sharpened at median costae on convex side. Calice oval, shallow; septa slightly exsert, decameral in arrangement; pali well developed, 10 in number; columella papillate, serial. No epitheca.

Remarks: The corallum is like *Placotrochides dentiformis* ALCOCK, but the pali are well-developed as in *Caryophyllia*. Monotypic at present.

Premocyathus compressus (YABE & EGUCHI)

Pl. X(II), Figs. 13, 14.

Caryophyllia compressa YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Corallum free, curved, compressed, horn-shaped in side view, more or less keeled along outer or convex border. Calice ovate, pointed at outer border of corallum, calicular fossa shallow, almost occupied by columella and pali. Costae, corresponding in number with septa, low, broad, and subequal, and distinct throughout face from calicular margin to base; one of them on outer border of corallum more prominent than others. Septa slightly exsert, usually 30–40, more commonly 38 in number, arranged apparently in 4 cycles in decameral plan; highest cycle incomplete. 10 principal septa of first two cycles subequal, extending to near columella, with their free inner margin more or less widened and sinuous. 10 septa of third cycle extending inwardly to about three-quarters of principals and ending in broad sinuous free margin. Septa of the last cycle thinner than, but as long as those of third cycle. Columella elongate, formed of few upright twisted rods, which are very similar to those of pali.

Dimensions (in mm) of medium sized specimens.

Loc. Kikaizima, Reg. No. 60747; Specimen No. ...	1	2	3	4
Longer diameter of calice	7	7	8	7
Shorter diameter of calice	4	5	6	5
Height of corallum	11	15	16	12
Length of columella	3	2.5	3	3
Number of septa	38	28	32	38

Remarks: The most common medium-sized specimens are taken as the basis of the above description; the height of corallum and the number of septa of the last cycle show some variation. The present species differs considerably in its compressed corallum from the other species of *Caryophyllia* as stated in the diagnosis of the genus *Premocyathus*.

Caryophyllia scobinosa decapali YABE & EGUCHI is similar to the present species, both having decameral pali and septa, but corallum is much compressed in the present species. There are some fossil species of *Trochocyathus* from the Tertiary of Europe which have similarly compressed and horn-shaped corallum; they differ essentially from the present species by having one more crown of pali.

Placotrochides dentiformis ALCOCK also has a similar shape, but according to ALCOCK it is characterized by wanting pali. We have not yet seen a young specimen of the present species, but the broken basal part of the mature specimens suggests that the juvenil and mature stages do not much differ in characteristic features.

Localities: Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60747). (Type loc.)

Pleistocene, Narita beds of Zizôdo, Makuta-mura, Kimitu-gun, Tiba-ken (Reg. Nos. 60368, 38346); Narita beds of a Valley north of Ôwasi, Naka-mura, Kimitu-gun, Tiba-ken (Reg. No. 60363).

Recent material are from the following places:

Sôyô-maru St. 332 (Reg. No. 53642); St. 212 (Reg. No. 53641); St. 316 (Reg. No. 53643); St. 179 (Reg. No. 53644); St. 549 (Reg. No. 59139).

Distribution: Japan, (Recent, Pacific coast of central and southern Japan, 181–658 m; Japan Sea, off Wakasa Bay, 115 m; Plio-Pleistocene, Ryûkyû limestone of Kikai-zima; Pleistocene, Narita beds of Tiba-ken).

Genus *Goniocyathus* YABE & EGUCHI, 1932

Goniocyathus YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389.

"Turbinoliid. Corallum simple, fragile, subturbinate, basally attached upon a fragment of septa of the parental calice (septal budding). Calice polygonal or subpolygonal, deep. Wall and septa thin: costae unequal, rather apart, and distinct only near the margin of calice; outer surface finely granulated all over. Septa undulated towards the inner margin: principal septa 14–28 in number, with three thinner and shorter ones in each interval. Columella rudimentary, papillose: pali well developed before the median of the three minor septa in each interspace of the principal one. No epitheca." (YABE and EGUCHI, 1932, p. 389).

Above is the original diagnosis of the genus *Goniocyathus*. VAUGHAN and WELLS considered the present genus not to be distinct from *Caryophyllia*. We have re-examined the original specimens of its genotype, and also studied the newly added material. The chief characteristics distinguishing the present genus from *Caryophyllia* are as follows: 1) septal budding, irregular arrangement of septa and pali, 2) thin wall, 3) polygonal or subpolygonal calice.

Genotype: *Goniocyathus pacificus* YABE & EGUCHI.

Goniocyathus pacificus YABE & EGUCHI, 1932

Pl. X(II), Figs. 15, 16.

Goniocyathus pacificus YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 8, p. 389, fig. 2.

The generic diagnosis is based on the present species. We have lately examined some 10 more recent specimens and three fossil specimens; the latter are all young examples. All these specimens coincide precisely with the type specimen in essential features.

Dimensions (in mm):

St. No. 198, Reg. No.	50086	50097
Longer diameter of calice	13	18
Shorter diameter of calice	9	13
Height of corallum	8	10
Number of septa	66	98

Columella of this species is quite rudimentary and the pali are rather irregular in arrangement, without forming a single regular crown. The number of pali and principal septa vary according to age.

Localities: Sôyô-maru St. 113 (Reg. No. 50089); St. 180 (Reg. No. 50088); St. 198 (Reg. Nos. 50097, 50086) (Type loc.); St. 199 (Reg. No. 53672); St. 200 (Reg. No. 50090); St. 50097, 50086). (Type loc.); St. 304 (Reg. No. 59017).

Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 50731).
Distribution: Japan, Recent (Central Japan, 168–355 m); Plio-Pleistocene.

Trochocyathus (Tropidocyathus) wellsi YABE & EGUCHI, nov.

Pl. X(II), Figs. 22a, 22b.

Corallum free, cuneiform, base attenuated to an obtuse ridge which is broadly convex; subquadrate in side view and slightly elongated in direction of longer axis of calice. Calice ovate, obtusely pointed at ends of longer axis. Costae broad and flat, intercostal furrows narrow, deep; straight at middle part of sides and distinct only at upper two-fifths of height of corallum; those near lateral edges distinct almost to basal ridge, and more or less convex towards edges. Costae subequal and corresponding to septa, externally covered by small elongated echinules or granules. Septa 48 in number, four complete cycles in hexameral plan, much exsert, unequal, thickest at wall, and narrowing inwards; those of first two cycles extending to columella, those of third cycle slightly shorter and have well-developed pali before columella. Septa of fourth cycle short, with inner ends free. Septa not crowded. Pali in two crowns, 22 in total number, of which 12 well-developed ones are very characteristic to this species. Columella linear, formed of 12 serial process.

Dimensions (in mm):

Sôyô-maru St. 439; Reg. No. 53691	
Longer diameter of calice	18
Shorter diameter of calice	14
Height of corallum	17

Remarks: The present species is, in general, similar to *Tropidocyathus lessoni* from the East Indies and Japan; but has the wing-like expansion of the lateral edges less developed and the characteristic coupled pali as in *Citharocyathus conicus*. Moreover, the present species is quite different in ornamentation from *Tropidocyathus lessoni* and its allies, and resembles in this feature *Eusphenotrochus moseri* WELLS and *Platytrochus stokesii* MILNE EDWARDS & HAIME, although *moseri* has lamellar essential columella and *stokesii* has no pali; farther, both of them belong to quite different genera. The specific name is dedicated to D. T. W. WELLS.

Locality: Sôyô-maru St. 439 (Reg. No. 53691). (Type loc.)
Distribution: Japan, known only from the type locality.

Trochocyathus (Thecocyathus) hanzawai YABE & EGUCHI, 1932

Pl. X(II), Figs. 23, 24, 25.

Trochocyathus (Thecocyathus) hanzawai YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Corallum conical or cylindro-conical, slightly compressed, truncated at calicular margin, sometimes bluntly pointed at base or more usually attached with short, small cylindrical pedicle. Full grown corallum rather cylindrical, and curved near bluntly pointed base. Calice ovate, moderately deep; septa subequally exsert lying nearly on the same plane. Septa 48 in number, little differing in size, arranged in four complete cycles in regular hexameral plan. Septa of first

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Fig. 2 in p. 389 of YABE and EGUCHI, A Study of the Recent Deep-Water Coral Fauna of Japan. Proc. Imp. Acad., Vol. VIII, No. 8, represents the type specimen from the Sôyô-maru St. 198 (Reg. No. 50086) in calicular and lateral views, enlarged twice.

two cycles subequal and somewhat more exsert and more projecting inward than those of third and fourth cycles which are subequal, though tertiaries are slightly higher and longer than quaternaries; lateral faces covered by radial rows of fine granules and outer edges regularly beamed. Pali well developed in two crowns; pali of outer crown lying before septa of third cycle larger than those of inner crown standing before septa of first two cycles, which are small and rounded and sometimes almost reduced to small papilla hardly distinguishable from those of columella. Columella oblong, papillate, formed of straight rods in two or three rows, and appearing spongy at lower part of corallum, by being united with each other by synapticular processes. Costae subequal, thick and closely set; epitheca well developed in some specimens but usually thin; intercostal grooves narrow and shallow, being deep only near calicular margin.

Dimensions (in mm):

Reg. No. 60749, Specimen No.	1	2
Longer diameter of calice	14	12
Shorter diameter of calice	11	9
Height of corallum	34	10

Remarks: Some 320 specimens in every stage of development are examined. The younger specimen (the smallest one we have examined) measured above is conical with pointed base, being a much convex cone in its profile view. Full grown forms are subcylindrical with nearly parallel sides throughout their whole height except for abruptly diminishing its diameter downwards for 5 mm near the pointed base. The larger specimen measured above is 34 mm high, with the conical basal part some 6 mm and the cylindrical part some 28 mm high; the latter part is more or less compressed. The juvenil and mature forms are connected by a large number of specimens in every intermediate stages of growth.

Trochocyathus mitratus (GOLDFUSS), the genotype ranging from the Miocene to the Pliocene of Europe, is a similar species; but the present species is evidently epithecate and belongs to its subgenus *Thecocyathus*; besides, in the present species the corallum is narrower and columella better developed.

Locality: Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 60749). (Type loc.)

Distribution: Japan, known only from the type locality.

Rhizotrochus niinoi YABE & EGUCHI, nov.

Pl. XII(IV), Fig. 4.

Corallum turbinate, attached with a small cylindrical pedicle and many cylindrical root-like appendages. Wall epithecate, thin, with concentric rings of growth and epitheca prolonged from two or three basal rings to hollow root-like processes which are in direct communication with interior of corallum. Calice circular, deep; septa not exsert, nor crowded, 48 in number, arranged in regular hexameral plan; six of first cycle largest and extending deeply into calicular fossa; six of second cycle less projecting, and 12 of third cycle thinner and half as long as preceding ones; septa of last cycle quite short and rudimentary. No columella, nor endotheca. Inner margin of principal septa vertical, thin and straight.

Dimensions (in mm):

Hukui-maru St. 16; Reg. No. 60820

Diameter of calice	10
Height of corallum	11
Number of septa	48

The post-embryonic development of the present species can be traced on these specimens. The youngest specimens, 2 mm in diameter, possess 24 septa, arranged in 3 cycles of hexameral plan, and those, 4 or 5 mm in diameter usually 48 septa, arranged in 4 cycles; this stage continues almost up to 7 mm and first in the specimen No. III listed above (diameter 7 mm), septa of the fifth cycle begin to appear, they are quite small and rudimentary, being only visible under the magnifier. In growing larger than 8 mm, the coral attaines maturity and exhibits all the features characteristic of the present species, as shown in the above description.

The specimens with 48 septa of the present species agree fairly well with the description of *B. symmetrica* MOSELEY which is usually larger. It is possible that *B. symmetrica* does not represent a distinct species in itself, being founded on juvenile specimens of such allied species as *B. palifera* ALCOCK, *B. stephana* ALCOCK and *B. hawaiiensis* VAUGHAN etc.

Bathyactis palifera ALCOCK living in the seas bordering Japan and the East Indies is the nearest ally of the present species, but the former species is characterized by having larger corallum which is built more delicately and characterized by pali forming distinct lobes before the inner end of the septa of the second cycle. *B. stephana* ALCOCK from the Indian Ocean is another ally; this is also finer in structure and has septa much elevated near the calicular fossa, but marginally quite narrow or even excavated.

Locality: Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 50236) (Type loc.).

Distribution. Japan, known only from the type locality.

Stephanophyllia (Letepsammia) japonica YABE & EGUCHI, 1932

Pl. XII(IV), Figs. 8a–c.

Stephanophyllia (Letepsammia) japonica YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443: YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 281, figs. 1–3.

Corallum semi-lenticular, lower surface flat or slightly convex, upper surface convex. Lower surface or wall perforated by 16 to 20 small rounded holes arranged in regular radial rows in interspaces between costae; costae very thin and covered with a row of minute granules. Septa arranged in five cycles; fifth cycle often incomplete. Septa of first and second cycles straight, subequal and reach center of calice; those of third and higher cycles uniting in pairs at inner margin with preceding one and forming deltoid groups. All septa fenestrated, excepting those of first cycle, which are imperforated at their upper part, as shown in fig. 3 (YABE and EGUCHI, 1934, Proc. Imp. Acad., Vol. X, No. 5, p. 281). Septa at edge beset with equidistant dentations, or regularly beamed, which diminish in size towards periphery of corallum, and covered on sides by thin elongated spines in rows which correspond to dentations of upper margin of septa. Columella elongate, formed of five or six radial rods and inner margin of principal septa united laterally with trabecules which are sometimes much thickened and look lamellar.

Dimensions (in mm):

Loc. Kikai-zima, Reg. No. 50236

Specimen No.	I	II
Diameter of calice or disks	14	3
Height of corallum	5	1
Number of septa	96	48

Remarks: This species was once briefly described (YABE and EGUCHI, 1934, loc. cit., p. 281), and some more details have been given above. There are many specimens, young and

Remarks: The above described specimen is from the entrance of Wakase Bay, where this and three other specimens were dredged by Mr. H. NIINO; lately we have examined more specimens collected by Dr. K. ERI from the sea near the Misaki Marine Biological Station. All these specimens bear the same characteristics and evidently belong to one and the same species.

Rhizotrochus typus MILNE EDWARDS & HAIME from Singapore is a larger, more depressed, and compressed species, with septa, after MILNE EDWARDS and HAIME, more crowded and less extending into the calicular fossa. The specimen from the deep waters of Palao formerly assigned by the senior author and T. SUGIYAMA to *R. typus* has well-developed columella; evidently it differs more from the present species, and may represent another species, which is new and for which *Rhizotrochus palaoensis* n. nom. is here proposed for its distinction. *Flabellum magnificum* of HARRISON (1911) from the Persian Sea is evidently a representative of *Rhizotrochus* and not *Flabellum;* it resembles strongly *R. palaoensis.*

Localities: Hukui-maru St. 16 (Reg. No. 60820). (Type loc.); St. 20; St. 28. Near Gentatuse, Wakasa Bay. Coll. H. NIINO, 1936. Off Misaki, Kanagawa-ken. Coll. Dr. K. ERI.

Distribution: Japan, (Japan Sea, Wakasa Bay; Pacific coast, Sagami Bay).

Bathyactis kikaiensis YABE & EGUCHI, 1932

Pl. XII(IV), Figs. 6, 7.

Bathyactis kikaiensis YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Corallum thin and fragile, semi-lenticular, or plano-convex, with circular, flat or slightly convex base. Wall basal, forming basal disc of corallum, not perforated, and densely covered by minute granulations; Costae distinct, radial, corresponding to septa, and usually being prominent towards periphery. Calice superficial, slightly concave at centre. Septa thin, 96 in number, arranged in five complete cycles of hexameral plan. 6 septa of first cycle free from deltoid groups, extending to columella, and with upper margin at about middle part strongly elevated upwards to form a lobe, and at inner one-third divided into 3 or 4 spiniform lobes which diminish in size towards columella. Septa of second cycle also reach columella, low in inner part with dentate margin and exsert in outer part with entire margin; sometimes first spiniform lobe exsert as much as that of primary lobes. Septa of 3rd and 4th cycles smaller than those of first two cycles; quinaries lower and shorter, not much extending inwards from periphery. All septa of second and higher cycles form deltoid groups connected by membraneous processes in such a way that each two opposite septa of a higher cycle respectively unite with preceding one. Septal face ornamented with radial carinae formed of linearly arranged granules. Synapticula present near bottom of interseptal loculi connecting septal carinae of opposite septa.

Dimensions (in mm):

Loc. Kikai-zima; Reg. No. 50236.

Specimen No.	I	II	III
Diameter of disks (calice)	15	8	7
Height of corallum	4	2.5	2.5
Number of septa	96	96	96

No. I is the largest and No. III is the smallest with quite rudimentary septa of the last cycle.

Remarks: We have examined some 110 specimens, large and small; these evidently belong to one and the same species, which is new to science. The above description is based on full grown specimens.

mature, varying in great extent in their diameter (3–16 mm) and height and also in the number of septa. Younger specimens show a fair resemblance to the Cretaceous species, "*Micrabacia cornula*"; in them, the first 96 septa are complete, and the septa of the last cycle vary much in their development in those a little over 6 mm in diameter, while being better developed in larger specimens.

In general shape of corallum, it resembles fairly well *Stephanophyllia fungulus* ALCOCK, but is much finer in structure and more marked in perforation. In the last characteristic it agrees with *Stephanophyllia formosissima* MOSELEY, although it is smaller in size and stouter in structure. Thus in short our species forms the connecting link between the subgenera *Stephanophyllia* (s.s.) and *Letepsammia*.

Locality: Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken (Reg. No. 50236). (Type loc.).

Distribution: Japan, known only from the type locality.

Heteropsammia ovalis japonica YABE & EGUCHI, 1932

Pl. XII(IV), Fig. 21.

Heteropsammia ovalis japonica YABE and EGUCHI, 1932, Proc. Imp. Acad., Vol. VIII, No. 9, p. 443.

Corallum cylindrical, high; base oval, little wider than or nearly equal to calice. Side with no costae, nearly perpendicular to plane of base; surface of side and base apparently smooth or velvet-like, but under the magnifier covered uniformly by minute, pointed, closely-set, irregular granules, which are usually interlocked with those of opposite septa. Calice oval or usually cocoon-shaped, more or less narrowed and little elevated at middle of longer axis; margin serrate, owing to projected margin of principal septa and adjacent larger septa of next higher cycle, which form altogether a spongy mass as is usual in corals of *Eupsammidae*. Walls perforated, especially at thickened part of principal septa. Septa usually 64 in number, laterally covered by spiniform granules and evenly perforated. Principal septa 14–16, subequal and usually thickened at calicular margin and amalgamated with proximal portion of two adjacent larger septa of higher cycle; they are largest of all cycles. In chamber partitioned off by two adjacent principal septa, the annexed two exsert septa of second size lying immediately adjacent to principal one unite at columella so as to enclose short and rudimentary septa of third-size in inner half of chamber. Second-sized septa with inner margin prolonged to form paliform lobes, which are usually well marked. Columella elongated on longer axis of calice, spongy.

Dimensions (in mm):

Loc. Kikai-zima, Reg. No. 60748.

Specimen No.	I	II	III	IV
Height of corallum	16	13	11	6
Longer axis of calice	13	13	9	8
Shorter axis of calice	7	6	7	6

Remarks: About 100 specimens have been examined, they show some variation in size and number of principal septa. The above description is based on the most common type, and a few specimens are measured above. Smaller specimens diverge from the above description by having typical hexameral septa in 4 complete cycles; they agree with the larger ones in all the other essential features. The larger and smaller specimens are considered by us as a single species in different growth-stages.

In cocoon-shaped calice, this species resembles *H. michelinii* from the Philippines and South China Sea, which is the genotype of this genus, but can be easily distinguished from it,

by higher corallum having fewer septa. *H. ovalis* has similar calice and many other characteristics common with the present forms, but the former has fewer septa than the latter in its normal growth.

Locality: Plio-Pleistocene, Ryûkyû limestone of Kikai-zima, Kagosima-ken, (Reg. No. 60748). (Type loc.)

Distribution: Japan, known only from the type locality.

V. LISTS OF THE RECENT CORALS ACCORDING TO LOCALITIES

The many stations of dredge operation together with oceanographical data are given in the following pages together with their respective coral fauna.

1. "Sôyô-maru"—collection

Surveying ship of the Imperial Fisheries Experimental Station, Tôkyô. Dredge operation prosecuted during 1922–1930.

The following lists give the data of the oceanographical survey of the "Sôyô-maru"[1] on the continental shelf bordering Japan during 1922–1930, the results are simply quoted from the original papers from the "Report of a Survey of the Continental Shelf Bordering Japan" I–III, published in 1928–1930.*

Among the 658 stations of dredge operation of the Sôyô-maru, the following 192 yielded the present corals; the abbreviations used in the list are as follows:

C. ..... Coral	P. ..... Pebbles
c.S. ..... Coarse Sand	Pum. ..... Pumice Stone
Cy. ..... Clay	R. ..... Rock
f.S. ..... Fine Sand	S. ..... Sand
G. ..... Gravel	s.M. ..... Sandy Mud
M. ..... Mud	Sh. ..... Shells
m.S. ..... Muddy Sand	St. ..... Stones

* Report of a Survey of the Continental Shelf bordering Japan.

1. Record of collecting Operations 1922–1927 (Tôhoku area, from Sunosaki of Tiba-ken at the south to Siriya-zaki of Aomori-ken at the north). Annotation of the Oceanographical Research, Vol. III, No. 1, 1928.
2. Record of collecting Operations 1927–28 (Tôkai area and Nankai area, from Suno-saki of Tiba-ken at the east to Satano-misaki of Kagosima-ken at the west). loc. cit., Vol. III, No. 2, 1928.
3. Record of collectng Operations 1928–1930 (West coast of Kyûsyû, Tusima-strait, Japanese side of Japan sea, and Tugaru Strait). Semiannual Report of Oceanographical Investigation, Report 48, 1931.

The species marked with an asterisk is a colonial form and is not treated in this paper.

Years	Areas	Station Nos.	Surveying ships
1926	Suno-saki[2] to Siriya-zaki[3]	1– 78	Sôyô-maru[1]
1926	Siriya-zaki to Kinka-zan[4]	79–102	,,
1927	Suno-saki to Kinka-zan	103–133	,,
1925	Off Kinka-zan	134–141	,,
1925	Off Siwoya-zaki[5]	142–146	,,
1925	Suno-saki to Kinka-zan	147–149	,,
1926	Kinka-zan to Siriya-zaki	150–155	,,
1926	Suno-saki to Siriya-zaki	156–172	Fishing boats
1922	Off Kinka-zan	173	Tenô-maru[8]
1923	Suno-saki to Siriya-zaki	174–177	,,
1927	Iro-zaki[6] to Asizuri-zaki[7]	178–232	Sôyô-maru
1927	Kurose[9] near Is. Hatizyô[10]	233–235	,,
1927	Sagami[11] and Suruga[12] Bay	236–272	,,
1928	Seno-umi,[13] Suruga Bay	273–291	,,
1928	Satano-misaki[14] to Omae-zaki[15]	292–380	,,
1927	Omae-zaki to Siwono-misaki[16]	381–390	Fishing boats
1928	Muroto-zaki[17] to Omae-zaki	391–401	,,
1928	Satano-misaki to Muroto-zaki	402–409	,,
1928	West coast of Kyûsyû	410–411	Sôyô-maru
1929	West coast of Kyûsyû	412–445	,,
1929	Tusima[18]-Strait	446–495	,,
1929	Vicinity of Is. Oki[19]	496–541	,,
1930	Wakasa[20]-Bay to Tugaru[21]-Strait	542–562	,,
1930	Yamato[22]-Ridge	563–567	,,
1930	Wakasa-Bay to Tugaru-Strait	568–598	,,
1930	Vicinity of Sado[23]	595–615	,,
1930	Wakasa-Bay to Tugaru-Strait	616–648	,,
1930	Tugaru-Strait	649–658	,,

1) 蒼鷹丸　2) 洲ノ崎　3) 尻矢崎　4) 金華山　5) 鹽屋崎　6) 石廊崎
7) 足摺崎　8) 天鵬丸　9) 黒瀬　10) 八丈島　11) 相模　12) 駿河
13) 瀬ノ海　14) 佐多岬　15) 御前崎　16) 潮岬　17) 室戸崎　18) 對馬
19) 隱岐　20) 若狭　21) 津輕　22) 大和　23) 佐渡

Station No.	Position						Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude			E. Longitude							Surface	Bottom	Surface	Bottom		
5	35°	03′	00″	140°	16′	20″	(1926) June 17	9:45	269	20.8	19.4	10.0	25.86	25.70	s.M.	*Flabellum distinctum* *Deltocyathus orientalis*
6	34	59	00	140	27	00	do	13:00	311	20.5	20.5	10.1	25.83	25.71	....	*Flabellum distinctum*
H. 9	35	18	40	140	53	25	June 22	13:35	238	20.1	22.4	10.1	25.99	25.70	S.	*Fungia distorta*
11	35	25	00	141	10	40	June 23	7:10	375	....	23.2	8.2	25.95	25.36	S.G.	*Flabellum deludens* *Heterocyathus aequicostatus*
16	36	08	40	141	03	00	June 24	13:30	530	19.6	15.8	3.6	25.36	25.26	m.S.	*Balanophyllia fistula*
21	36	46	40	141	14	00	June 27	12 55	209	16.8	15.3	7.5	25.28	25.34	S.	*Deltocyathoides japonicum*
22	36	46	40	141	30	00	June 29	11:50	539	16.3	14.0	4.0	25.04	25.32	m.S.	*Desmophyllum delicatum*
23	36	58	00	141	21	40	do	15:15	170	19.6	15.9	8.5	25.11	25.35	M.	*Deltocyathus orientalis*
59	39	52	00	142	13	50	July 9	14.43	168	21.5	16.1	9.1	24.83	25.24	c.S.Sh.	*Deltocyathus orientalis*
76	41	11	30	141	28	45	Jnly 7	12:33	128	20.4	18.1	14.3	25.24	25.37	c.S.Sh.	*Flabellum transversale*
83	40	35	30	141	38	00	Nov. 2	10:10	55	11.0	15.1	16.1	24.67	24.80	S.	*Heterocyathus* cf. *japonicus*
86	40	16	30	141	55	00	do	15:40	86	12.7	16.2	16.0	24.86	24.86	S.	*Heterocyathus* cf. *japonicus*
90	39	35	00	142	07	20	do	14:42	152	16.0	16.8	9.3	24.73	25.07	S.Sh.	*Deltocyathus orientalis*
103	34	55	20	140	00	00	(1927) Feb. 27	11:20	117	10.6	17.5	15.6	25.83	25.83	m.S.	*Dendrophyllia?* sp.
H.107	35	10	10	140	36	00	Feb. 28	14:25	115	13.3	17.3	13.3	25.98	25.83	G.	*Flabellum rubrum* *Flabellum transversale conicum* *Caryophyllia japonica* *Stephanophyllia formosissima* *Balanophyllia fistula* *Balanophyllia gigas* **Dendrophyllia boschmai* **Dendrophyllia* sp.
109	35	31	59	141	05	10	Mar. 2	9:00	123	10.0	17.6	13.1	25.98	25.73	Sh.G.	*Flabellum deludens* *Balanophyllia rediviva* **Dendrophyllia* sp.
110	35	31	00	140	51	30	do	11:20	59	....	15.3	13.2	25.87	25.74	f.S.Sh.	*Deltocyathus orientalis*
H.113	35	15	10	140	46	00	do	16:55	196	....	18.7	12.1	25.98	25.68	G.Cy.	*Goniocyathus pacificus* *Flabellum deludens*
118	36	15	40	140	50	00	Mar. 3	16:35	124	13.3	13.7	8.9	25.72	25.26	m.S.	*Flabellum deludens*
123	37	14	45	141	20	45	Mar. 6	11:45	137	9.4	6.6	6.2	25.14	25.13	c.S.	*Caryophyllia japonica*
126	37	41	00	141	23	45	Mar. 7	7:00	146	10.0	4.8	4.6	25.07	24.92	f.S.	*Deltocyathus orientalis*
129	37	21	20	141	14	00	Mar. 10	8:55	82	10.0	7.6	6.9	25.37	25.26	f.S.	*Flabellum deludens*
130	37	07	30	141	08	40	do	10:30	104	10.0	7.5	7.0	25.26	25.26	....	*Flabellum transversale conicum*
135	38	17	00	141	45	00	(1925) Nov. 21	....	159	13.2	16.4	....	25.24	....	....	*Deltocyathoides japonicum*
139	38	17	00	142	00	00	Nov. 24	....	320	....	....	....	....	....	....	*Deltocyathus orientalis*
140	38	17	00	142	05	00	do	12:00	344	12.8	15.3	4.9	25.29	25.14	....	*Deltocyathus orientalis*
146	37	00	00	141	26	00	Nov. 30	13:10	201	13.3	16.3	10.9	25.39	25.44	....	*Caryophyllia japonica*
179	34	31	30	133	52	00	(1927) June 28	8:00	187	23.0	23.4	19.3	25.65	25.76	S.Sh.	*Premocyathus compressus* *Flabellum japonicum* *Anthemiphyllia dentata* *Stephanophyllia formosissima* *Balanophyllia fistula* *Balanophyllia rediviva*
180	34	37	30	138	44	00	do	10:08	276	24.6	22.7	10.2	25.58	25.59	m.S.	*Goniocyathus pacificus*
188	34	30	00	138	24	00	June 30	14:46	214	25.3	22.6	10.9	25.50	25.56	....	*Flabellum distinctum* *Flabellum* cf. *transversale* *Flabellum deludens* **Madrepora* cf. *oculata*
198	34	17	45	137	04	45	July 4	8:25	168	26.3	23.0	11.6	25.56	25.59	s.M.	*Goniocyathus pacificus*
199	34	10	30	136	54	30	July 1	7:51	207	26.2	23.8	9.7	23.23	25.56	s.M.	*Goniocyathus pacificus* *Fragilocyathus conotrochoides* *Flabellum deludens*
200	34	07	00	136	41	30	do	9:50	355	26.4	23.6	8.0	24.54	25.55	s.M.	*Goniocyathus pacificus* *Deltocyathoides japonicum* *Flabellum japonicum*
204	33	55	00	136	18	30	July 2	8:55	324	26.8	24.2	8.8	25.41	25.46	S.	*Deltocyathoides japonicum*
205	33	47	30	139	09	30	do	10:50	224	25.8	24.1	11.3	25.43	25.70	M.S.Sh.	*Flabellum deludens*
207	33	30	40	135	57	15	July 3	7:55	229	24.7	22.9	11.7	25.54	25.70	S.	*Flabellum distinctum* *Flabellum* aff. *transversale*

Station No.	Position		Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude	E. Longitude					Surface	Bottom	Surface	Bottom		
208	33° 25′ 00″	135° 48′ 30″	do	13:35	219	26.7	25.4	12.1	24.80	25.67	G.S.	*Caryophyllia japonica*
209	33 25 40	135 39 10	do	12:28	256	26.9	27.7	15.3	25.29	25.70	G.S.	*Flabellum distinctum* *Stephanophyllia formosissima*
210	33 29 20	135 28 25	July 4	7:45	165	26.4	26.1	16.2	25.29	25.73	f.S.	*Caryophyllia scobinosa decapali* *Deltocyathus magnificus* *Flabellum distinctum* *Flabellum deludens* *Anthemiphyllia dentata* *Balanophyllia gigas* *Balanophyllia fistula*
211	33 33 30	135 19 00	do	9:27	190	26.7	25.2	14.8	25.16	25.82	G.Sh.	*Flabellum distinctum* *Flabellum* cf. *transversale* *Balanophyllia gigas* *Balanophyllia fistula* *Balanophyllia* aff. *affinis* **Goniocorella* sp.
212	33 37 50	135 10 30	do	10:50	181	27.8	24.6	14.3	25.14	25.71	f.S.	*Primocyathus compressus* **Goniocorella* sp. *Balanophyllia gigas* *Balanophyllia fistula* *Balanophyllia rediviva*
213	33 39 00	134 55 00	July 8	10:15	353	28.0	26.5	14.7	25.11	25.56	s.M.	*Deltocyathus vaughani*
216	33 26 00	134 22 00	July 9	6:19	274	29.0	25.9	10.5	25.32	25.59	M.	**Goniocorella* ? sp.
219	33 07 20	134 08 00	do	12:35	210	30.5	26.8	17.0	25.29	25.76	....	*Balanophyllia fistula*
220	33 07 20 33 15 20	134 10 00 134 01 00	do	14:41	234	30.6	27.5	11.8	25.31	25.58	S.Sh.	*Caryophyllia japonica* *Caryophyllia scobinosa decapali* *Trochocyathus pileus* *Deltocyathus orientalis* *Flabellum distinctum* *Flabellum* aff. *transversale* *Flabellum deludens* *Anthemiphyllia dentata* *Anthemiphyllia* sp. *Bathyactis palifera* *Endopachys japonicum* *Balanophyllia gigas* *Balanophyllia fistula*
221	33 20 30	135 54 00	July 20	7:58	209	27.5	26.6	14.1	25.28	25.25	m.S.	*Flabellum distinctum*
222	33 18 20	133 44 40	do	9:33	210	28.4	26.4	13.5	25.71	25.31	f.S.	*Caryophyllia scobinosa decapali* *Deltocyathus orientalis* *Flabellum distinctum* *Flabellum rubrum* *Flabellum rubrum debile* *Flabellum deludens* *Balanophyllia fistula* *Balanophyllia rediviva*
223	33 13 50	133 38 40	do	10:59	311	28.7	26.4	9.8	25.71	25.29	....	*Caryophyllia alcocki* *Flabellum deludens* *Flabellum rubrum*
231	32 31 45	132 57 30	July 24	12:29	113	31.5	27.2	18.7	25.24	25.82	....	*Balanophyllia fistula*
232	33 02 00	134 48 25	July 30	17:10	269	30.7	29.5	16.3	25.21	25.83	R.	*Flabellum pavoninum* *Deltocyathus orientalis* *Balanophyllia fistula*
233	33 21 30	139 39 00	Aug. 8	10:46	198	28.5	28.1	18.0	25.53	25.87	R.	*Paracyathus pruinosa*
235	33 31 00	140 11 00	do	16:40	176	29.2	28.2	19.4	25.52	25.92	R.	*Paracyathus pruinosa* *Balanophyllia fistula* **Dendrophyllia* cf. *serpentina*
238	35 05 30	139 39 53	Nov. 6	13:03	106	18.9	20.2	18.9	25.11	25.67	s.M.Sh.	*Deltocyathus orientalis*
239	35 06 00	139 39 10	do	14:50	307	18.8	20.8	12.3	25.49	25.67	S.St.	*Flabellum distinctum* *Anthemiphyllia dentata* *Stephanophyllia formosissima* *Balanophyllia* cf. *affinis*
240	35 10 30	139 32 35	do	17:00	192	17.9	20.2	15.2	25.10	25.77	f.M.	*Deltocyathus orientalis* *Balanophyllia* sp.
244	35 15 30	139 18 00	Nov. 8	7:30	135	13.2	20.5	17.8	25.25	25.63	s.N.G.	*Caryophyllia japonica* *Balanophyllia diomedae*
246	35 13 10	139 11 00	do	10:35	172 -446	....	19.5	7.0	24.67	25.50	G.	*Deltocyathus orientalis*
247	35 09 20	139 10 35	do	12:00	159 -128	12.7	19.8	17.3	25.20	25.66	M.	*Deltocyathus vaughani*

Station No.	Position						Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude			E. Longitude							Surface	Bottom	Surface	Bottom		
249	35°	03′	30″	139°	07′	20″	Nov. 9	7:05	229	13.8	20.4	13.2	25.47	25.67	G.s.M.	*Deltocyathoides japonicum*
252	34	56	40	139	09	50	do	13:13	289	16.4	20.8	11.6	25.33	25.47	m.S.	*Ceratotrochus (Conotrochus) parahispidus*
253	34	54	30	139	09	35	do	15:22	452	16.6	21.0	12.0	25.36	25.43	m.S.	*Fungia distorta*
254	34	50	30	139	06	00	Nov. 10	8:09	174	16.2	20.7	13.8	25.44	25.53	G.S.	*Caryophyllia japonica* *Deltocyathus orientalis*
255	34	46	15	139	05	00	do	10:04	263	17.1	20.7	13.5	25.52	25.71	G.m.S.Sh.	*Caryophyllia japonica* *Flabellum deludens* **Goniocorella dumosa*
259	34	41	15	138	43	00	Nov. 15	10:35	188	17.1	19.8	12.0	25.27	25.61	s.M.	*Flabellum distinctum* *Flabellum transversale* *Flabellum transversale conicum* *Heterocyathus japonicus* *Deltocyathus orientalis* *Ceratotrochus (Conotrochus) parahispidus* *Bathyactis symmetrica* *Balanophyllia* sp. **Dendrophyllia arbuscula*
262	35	00	40	138	34	00	Nov. 17	6:58	604	13.9	19.4	6.0	25.27	25.64	m.S.	*Caryophyllia japonica* *Caryophyllia* sp.
266	34	38	30	138	29	00	Nov. 18	8:45	128	13.3	19.0	14.3	25.52	25.74	G.R.	*Flabellum distinctum* *Anthemiphyllia* sp. *Balanophyllia gigas* *Balanophyllia diomedae* *Balanophyllia* sp.
268	34	30	30	138	59	10	do (1928)	14:40	549	14.9	18.3	17.5	25.61	25.66	G.	*Ceratotrochus (Conotrochus) funicolumna*
276	34	43	50	138	39	50	July 2	11:05	77	23.0	23.0	15.0	22.24	25.64	s.M.	*Flabellum distinctum*
280	34	42	50	138	28	15	do	15:20	273	23.5	22.5	9.3	23.88	25.50	M.	*Flabellum distinctum* *Anthemiphyllia dentata* *Stephanophyllia formosissima*
283	34	38	25	138	29	40	July 4	10:14	177	23.2	22.3	12.0	23.68	25.52	G.m.S.Sh.	*Bathyactis symmetrica*
285	34	37	25	138	26	50	do	12:35	71	23.3	22.3	12.4	23.32	25.62	G.P.	*Caryophyllia paraoctopali*
286	34	36	10	138	26	30	do	13:10	123	22.3	22.4	14.3	23.69	25.70	s.M.	*Flabellum distinctum* *Trochocyathus pileus* *Anthemiphyllia dentata* *Stephanophyllia formosissima*
287	34	37	00	138	25	25	do	13:45	73	22.6	22.3	14.4	23.43	25.50	G.M.	*Flabellum distinctum*
288	34	38	30	138	28	00	July 5	12:07	77	23.0	22.5	14.3	23.72	25.64	G.M.Sh.	*Desmophyllum* cf. *alabastrum* *Caryophyllia japonica* *Flabellum distinctum* **Goniocorella ?* sp. *Stephanophyllia formosissima* **Dendrophyllia* cf. *cribrosa*
292	30	54	40	130	42	25	July 10	10:55	126	27.8	27.3	16.5	24.98	25.68	G.Pum.P.	*Flabellum distinctum* *Odontocyathus spiniger*
293	30	45	00	130	40	40	do	12.30	203	29.3	27.3	14.3	25.00	25.68	G.P.	*Caryophyllia scobinosa decapali* *Odontocyathus spiniger* *Deltocyathus magnificus* *Flabellum distinctum* *Anthemiphyllia dentata* *Bathyactis symmetrica* *Stephanophyllia formosissima* *Endopachys japonicum* *Balanophyllia* sp.
294	30	55	40	130	55	50	do	14:48	102	28.5	25.3	17.3	25.16	25.79	G.P.	*Caryophyllia paraoctopali* *Flabellum rubrum* *Balanophyllia fistula*
295	30	55	00	131	03	50	July 11	6:35	154	26.3	26.6	18.5	25.00	25.68	S.Sh.	*Flabellum distinctum* *Flabellum rubrum debile* *Stephanophyllia formosissima*
296	30	48	10	131	20	30	do	9:00	219	27.0	26.6	14.1	25.16	25.73	G.P.	*Flabellum rubrum*
298	31	05	45	131	14	35	do	14:40	117	27.8	27.1	18.9	25.00	25.68	Sh.	*Trochocyathus pileus* *Flabellum distinctum* *Stephanophyllia fungulus*
300	31	18	50	131	19	30	do	16:55	110	27.7	27.4	17.5	25.11	25.68	s.M.	*Flabellum distinctum*
301	31	13	10	131	26	10	July 12	8:00	181	27.0	26.9	16.8	25.00	25.73	G.S.Sh.	*Flabellum distinctum* *Flabellum deludens* *Heterocyathus aequicostatus* *Anthemiphyllia dentata* *Balanophyllia fistula*

Station No.	Position		Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific graeity S		Character of bottom	Deep Water Corals
	N. Latitude	E. Longitude					Surface	Bottom	Surface	Bottom		
302	31° 05′ 10″	131° 32′ 10″	July 12	10:00	582	28.6	27.0	6.2	25.13	25.40	M.	*Ceratotrochus (Conotrochus) parahispidus*
303	31 16 00	131 33 15	do	13:45	364	27.8	27.2	10.7	25.00	25.68	S.	*Bathyactis palifera*
304	31 24 40	131 34 40	do	15:15	241	28.3	28.4	14.3	25.07	25.76	s.M.	*Trochocyathus pileus* *Flabellum rubrum debile*
307	31 35 20	131 36 20	July 14	11:15	165	28.0	27.1	15.3	25.00	25.68	s.M.	*Odontocyathus spiniger* *Endopachys japonicum*
308	31 34 55 31 34 35	131 37 08 131 37 45	do	12:06	155	28.1	27.1	15.5	25.00	25.68	s.M.R.	*Heterocyathus* cf. *japonicus*
309	31 41 35	131 46 40	do	14:30	472	27.8	27.6	7.4	25.00	25.40	M.	*Ceratotrochus hiugaensis* *Flabellum* sp.
315	32 15 35	131 50 05	July 15	16:35	421	27.0	26.5	7.2	24.21	25.43	M.	*Ceratotrochus hiugaensis*
316	32 21 10	131 50 20	July 16	7:12	190	25.5	25.9	15.4	24.51	25.68	S.Sh.	*Caryophyllia scobinosa decapali* *Heterocyathus aequicostatus* *Flabellum distinctum* *Flabellum deludens* *Endopachys japonicum* *Balanophyllia fistula* *Balanophyllia* sp.
317	32 28 05	131 49 10	do	8:35	97	26.3	26.2	16.8	24.86	25.67	f.S.	*Flabellum rubrum* *Endopachys japonicum*
318	32 29 32	131 56 30	do	9:45	324	26.7	26.2	11.6	24.42	25.55	S.Sh.	*Flabellum deludens*
319	32 35 50	131 57 38	do	11:10	210	27.8	26.9	13.1	24.04	25.68	S.Sh.	*Flabellum deludens* *Flabellum distinctum*
322	32 49 00	132 15 20	do	15:40	110	27.0	24.1	16.5	25.13	25.77	S.Sh.	*Flabellum distinctum* *Citharocyathus conicus* *Deltocyathus orientalis* *Heterocyathus aequicostatus*
323	32 55 15	132 12 20	July 21	12:20	88	26.5	26.0	18.1	25.10	25.52	S.Sh.	*Ceratotroehus (Conotrochus) parahispidus* *Deltocyathus vaughani* *Deltocyathus magnificus*
324	32 51 35	132 22 55	do	14:00	106	25.6	26.2	17.5	24.86	25.52	S.	*Deltocyathus orientalis* *Citharocyathus conicus* *Heterocyathus aequicostatus* *Flabellum distinctum* *Flabellum rubrum* *Stephanophyllia formosissima*
325	32 45 00	132 23 30	do	15:03	210	27.0	26.7	15.2	25.13	25.65	G.S.	*Deltocyathus vaughani* *Deltocyathus magnificus* *Flabellum pavoninum paripavoninum* *Bathyactis palifera* *Balanophyllia gigas* *Balanophyllia* cf. *rediviva*
326	32 40 10	132 25 15	do	16:15	393	27.1	27.4	7.9	24.04	25.64	M.Su.	*Caryophyllia japonica* *Flabellum pavoninum paripavoninum*
327	32 41 20	132 30 10	do	17:25	216	26.9	27.0	13.1	24.91	25.64	S.Sh.	*Anthemiphyllia dentata* *Balanophyllia gigas* *Dendrophyllia aurea*
328	32 36 10	132 33 10	July 22	8:00	684	27.8	26.6	5.3	25.00	25.44	Cy.m.S.	*Flabellum deludens* *Deltocyathus vaughani*
329	32 38 10	132 39 35	do	9:45	296	27.8	27.7	12.6	25.10	25.54	S.Sh.	*Caryophyllia scobinosa decapali* *Odontocyathus spiniger* *Heterocyathus aequicostatus* *Flabellum rubrum* *Flabellum rubrum debile* *Flabellum deludens* *Flabellum pavoninum paripavoninum*
320	32 38 25	132 51 35	do	11:20	102	28.3	27.4	17.7	25.13	25.68	G.P.	*Flabellum rubrum debile* *Heterocyathus aequicostatus* *Balanophyllia fistula*
331	32 30 15	132 46 20	do	13:10	344	28.2	28.3	8.1	24.95	25.40	C.c.S.	*Caryophyllia japonica* *Cyathoceras diomedae* *Deltocyathus orientalis* *Trochocyathus caryophylloides* **Goniocorella dumosa* *Flabellum deludens*
332	32 26 30	132 48 40	do	14:40	658	28.3	28.5	5.3	25.00	25.54	G.m.S.	*Flabellum distinctum* *Flabellum rubrum debile* *Endopachys japonicum*
333	32 27 25	132 53 15	do	16:20	179	28.4	28.1	20.3	25.00	25.37	G.m.S.	*Premocyathus compressus*

Station No.	Position		Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude	E. Longitude					Surface	Bottom	Surface	Bottom		
336	32° 49′ 50″	133° 25′ 00″	July 26	12:00	522	26.8	26.9	6.3	23.05	25.52	M.	*Caryophyllia scobinosa* *Deltocyathus vaughani* *Fungia distorta*
339	33 16 50	133 30 30	July 28	7:50	106	26.7	27.6	19.5	25.13	25.53	s.M.	*Flabellum rubrum*
342	33 15 20	133 48 40	do	13:50	288 –527	27.5	27.8	6.3	24.32	25.47	M.	*Heterocyathus* cf. *japonicus*
343	33 11 30	134 03 00	do	17:50	366	27.3	27.4	9.1	24.58	25.47	G.M.Sh.	*Caryophyllia japonica* *Ceratotrochus(Conotrochus)parahispidus* *Flabellum pavoninum paripavoninum*
344	33 03 55	134 15 25	July 29	6:35	543	27.3	27.1	6.1	24.55	25.54	M.P.R.	*Desmophyllum dianthus*
345	33 15 10	134 12 00	do	10:15	199 –165	27.3	26.7	19.3	23.87	25.77	G.P.M.R.	*Flabellum distinctum* **Cyathelia axillaris* *Dendrophyllia boschmai*
349	33 42 50	134 50 30	Aug. 1	9:55	152	27.0	25.9	18.4	25.24	25.68	G.M.	*Flabellum deludens* *Heterocyathus aequicostatus*
352	33 39 50	135 06 30	do	16:55	154	26.7	26.3	16.7	24.83	25.68	S.Sh.	*Carpophyllia japonica* *Fragilocyathus conotrochoides* *Heterocyathus aequicostatus* *Flabellum distinctum* *Flabellum rubrum* *Anthemiphyllia dentata* *Balanophyllia gigas* *Balanophyllia fistula* *Endopachys japonicum*
356	33 23 42	135 42 48	Aug. 8	6:25	384	25.6	27.8	6.3	25.36	25.44	C.	*Ceratotrochus(Conotrochus)parahispidus*
361	33 51 32	136 16 48	Aug. 9	13:06	582	24.8	24.7	5.3	....	25.41	Cy.	*Caryophyllia japonica* *Deltocyathus vaughani*
362	34 02 42	136 20 28	do	15:39	132	25.2	24.8	13.7	24.33	25.67	S.Sh.	*Flabellum deludens* *Flabellum rubrum* *Endopachys japonicum*
365	34 12 09	136 44 28	Aug. 10	4:50	93	24.6	24.6	15.7	25.25	25.87	M.	*Flabellum distinctum*
368	34 15 14	137 12 40	do	11:35	600	25.7	27.4	5.8	25.31	25.50	M.	*Caryophyllia japonica* *Ceratotrochus(Conotrochus)parahispidus* *Deltocyathus vaughani*
369	34 22 30	137 24 50	do	14:40	274	27.8	25.4	9.5	24.72	25.52	c.S.	*Flabellum japonicum*
370	34 25 15	137 14 00	do	16:23	91	26.6	25.3	16.8	25.71	25.56	S.	*Stephanophyllia formosissima*
372	34 29 45	137 39 00	Aug. 13 (1927)	11:18	466	26.3	27.4	6.4	25.26	25.44	M.	*Deltocyathus vaughani*
388	34 28 50	137 32 15	Dec. 12 (1928)	9:00	136 –189	....	....	....	....	....	....	*Flabellum deludens*
395	33 43 20	135 16 00	Feb. 26	....	46	....	....	....	....	....	S.	*Heteropsammia cochlea*
410	31 39 15	129 59 30	Apr. 25 (1929)	....	139	....	....	....	....	....	m.S.	*Balanophyllia gigas*
412	31 02 00	130 33 00	July 13	8:15	219	27.3	25.8	13.7	25.25	25.71	Pum.	*Flabellum transversale conicum* *Deltocyathus magnificus* **Pourtalosmilia ?* sp. **Goniocorella* sp. *Bathyactis palifera* *Balanophyllia gigas* *Balanophyllia fistula*
414	30 33 30	130 19 00	July 13	14:13	514	28.1	27.9	8.2	25.15	25.53	m.S.	*Caryophyllia alcocki* *Ceratotrochus(Conotrochus)parahispidus*
416	31 01 15	130 09 30	July 14	10:55	379	28.3	26.7	9.7	25.32	25.54	S.	*Flabellum deludens* *Flabellum pavoninum*
417	31 10 15	130 26 00	do	13:33	192	28.1	26.0	13.9	24.92	25.61	s.M.S.	*Flabellum distinctum* *Odontocyathus spiniger*
418	31 10 30	130 11 30	do	15:37	133	27.4	25.2	12.1	25.16	25.59	S.	*Bathyactis palifera*
419	31 12 10	129 49 45	July 15	5:20	402	26.6	26.2	9.6	25.16	25.58	Pum.	*Flabellum pavoninnm paripavoninum* *Ceratotrochus(Conotrochus)parahispidus* *Deltocyathus vaughani*
420	31 22 15	129 42 30	do	7:44	132	26.4	25.6	16.8	24.21	25.71	C.	*Flabellum distinctum* *Flabellum transversale* *Flabellum rubrum* *Trochocyathus(Tropidocyathus)*cf.*lessoni* *Bathyactis symmetrica* *Anthemiphyllia dentata* *Balanophyllia fistula* *Balanophyllia affinis*

Station No.	Position		Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude	E. Longitude					Surface	Bottom	Surface	Bottom		
421	31° 25′ 00″	129° 54′ 00″	July 15	9:28	307	26.7	25.7	11.5	24.11	25.58	Pum.	*Flabellum deludens* *Deltocyathus vaughani*
422	31 31 45	130 06 15	do	11:37	88	28.1	27.0	17.8	24.24	25.65	S.	*Flabellum rubrum*
423	31 40 50	129 55 30	do	13:25	243	28.4	27.2	12.8	25.28	25.62	S.	*Flabellum deludens* *Trochocyathus pileus*
425	31 48 45	129 42 30	do	18:20	300	28.4	27.2	11.9	25.29	25.62	R.	*Caryophyllia japonica* *Odontocyathus spiniger* *Cyathoceras rubescens* *Trochocyathus pileus* *Flabellum distinctum* *Flabellum rubrum debile* *Flabellum transversale* *Flabellum deludens*
427	32 07 50	129 44 45	July 16	6:40	499	26.7	26.2	8.6	25.21	25.54	S.M.	*Anthemiphyllia* sp.
428	32 17 30	129 44 15	do	8:40	119	26.8	25.9	17.0	24.32	25.72	Pum.	*Flabellum distinctum* *Flabellum transversale conicum* *Flabellum rubrum* *Flabellum japonicum* *Caryophyllia japonica* *Caryophyllia scobinosa* *Heterocyathus aequicostatus*
429	32 16 15	129 33 15	do	10:10	223	27.2	26.4	13.7	25.03	25.68	R.G.	*Flabellum rubrum* *Flabellum distinctum* *Deltocyathus orientalis* *Anthemiphyllia* sp. *Stephanophyllia formosissima* *Balanophyllia ponderosa* *Balanophyllia* cf. *affinis* *Balanophyllia* cf. *hawaiensis*
431	32 22 00	129 25 50	do	15:00	152	28.0	26.6	16.3	24.86	25.71	Pum.Sh.	*Stephanophyllia formosissima*
437	31 48 00	128 27 45	July 19	9:27	307	27.3	25.7	13.9	24.79	25.58	S.Sh.	*Flabellum pavoninum* *Flabellum pavoninum paripavoninum* *Caryophyllia japonica* *Caryophyllia scobinosa*
438	31 55 15	128 17 00	do	11:45	219	27.9	27.2	15.0	25.51	25.71	Sh.	*Flabellum distinctum* *Flabellum pavoninum paripavoninum* *Flabellum rubrum* *Deltocyathus magnificus* *Bathyactis palifera*
439	31 52 00	128 01 00	do	13:55	155	27·9	26.9	15.6	25.29	25.59	S.Sh.	*Flabellum distinctum* *Caryophyllia scobinosa decapali* *Deltocyathus magnificus* *Tropidocyathus wellsi*
440	32 12 15	128 06 30	do	16:47	152	28.7	26.9	15.7	25.18	25.72	S.Sh.	*Anthemiphyllia dentata* *Flabellum distinctum*
441	32 18 00	128 21 45	do	18:53	353	27.2	27.0	11.0	25.31	25.61	S.Sh.G.	*Caryophyllia scobinosa* *Flabellnm pavoninum paripavoninum* *Flabellum rubrum*
444	32 25 45	128 37 30	July 20	8:50	194	27.9	27.2	15.0	25.01	25.74	S.Sh.	*Deltocyathus magnificus* *Flabellnm distinctum* *Flabellum transversale conicum* *Flabellum transversale* *Bathyactis palifera* *Balanophyllia fistula*
445	32 34 00	128 39 30	do	9:57	73	28.8	26.8	21.2	24.95	25.56	R.Sh.	*Stephanophyllia fungulus*
447	33 03 18	128 48 45	do	15:06	90	28.8	26.8	19.9	25.13	25.59	S.Sh.	*Deltocyathus orientalis*
451	32 43 00	128 11 45	July 22	18:10	187	28.3	28.0	14.0	24.79	25.67	S.Sh.	*Deltocyathus magnificus*
455	33 51 00	127 20 00	July 23	7:30	90	26·4	25.9	14.2	24.15	55.56	M.Sh.	*Flabellum distinctum* *Flabellum* cf. *transversale* **Dendrophyllia micranthus* (worned) **Dendrophyllia* sp. indet.
457	33 51 45	128 05 15	do	13:00	112	27.3	26.9	14.6	24.22	25.67	Sh.	*Flabellum rubrum*
458	34 16 30	128 23 45	do	16:27	81	26.7	25.4	14.5	24.57	25.52	s.M.	*Flabellum* aff. *transversale*
459	34 09 00	128 49 45	do	19:18	115	26 4	26.4	14.6	24.39	25.58	M.S.	*Flabellum deludens* *Flabellum rubrum*
462	33 59 30	129 08 30	July 24	9:10	117	26.3	26.3	15.5	24.50	25.87	c.S.Sh.	*Flabellum distinctum* *Flabellum* cf. *rubrum* **Madrepora oculata* *Stephanophyllia formosissima*

Station No.	Position		Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude	E. Longitude					Surface	Bottom	Surface	Bottom		
465	33° 33′ 00″	129° 15′ 00″	July 24	18:00	106	28.0	28.1	17.8	24.73	25.71	f.S.	*Flabellum* cf. *transversale* *Flabellum rubrum* *Heteropsammia cochlea*
467	34 02 00	129 31 45	July 5	4:40	110	26.7	27.3	16.8	24.21	25.71	c.S.Sh.	*Flabellum* cf. *transversale* *Caryophyllia japonica*
469	34 09 10	130 07 00	do	11:10	91	28.6	27.2	18.5	25.39	26.65	c.S.R.	*Flabellum rubrum*
472	34 36 30	130 23 45	July 27	17:05	130	28.4	27.6	15.5	24.70	25.71	S.	*Heterocyathus japonicus*
477	34 57 25	129 06 30	July 28	12:30	99	25.4	23.5	14.3	24.67	25.54	P.M.Sh.	*Flabellum distinctum*
487	35 27 30	130 35 35	Aug. 11	16:15	194	31.4	27.6	2.4	24.66	25.26	S.Sh.	*Flabellum* sp.
502	35 59 45	132 57 00	Aug. 15	18:10	110	28.5	28.3	18.6	24.80	25.71	S.	*Flabellum distinctum* *Deltocyathus orientalis*
504	36 14 45	133 04 45	Aug. 18	16:10	106	27.6	28.5	18.6	24.75	25.39	Sh.G.	*Deltocyathus orientalis*
520	35 43 00	133 07 30	Aug. 23	1:50	75	25.3	27.8	23.3	24.91	25.29	S.	*Flabellum distinctum* *Deltocyathus orientalis* *Anthemiphyllia dentata*
523	35 43 30	133 56 15	do	14:55	181	27.3	28.4	4.3	25.01	25.34	M.	*Flabellum* cf. *deludens* (worned) *Flabellum* cf. *transversale* *Deltocyathus orientalis*
524	35 39 00	134 04 30	do	16:30	88	27.1	28.4	22.5	24.80	25.32	Sh.S.	*Flabellum distinctum*
525	35 41 30	134 18 30	do	18:00	137	27.7	28.2	14.0	24.70	25.71	M.S.	*Deltocyathus orientalis*
530	35 45 15	134 31 45	Aug. 24	6:00	183	25.6	28.1	2.9	24.75	25.29	S.	*Anthemiphyllia dentata* *Flabellum transversale*
540	35 45 10	134 57 30	Aug. 25 (1930)	9:45	123	27.8	27.7	14.3	24.79	25.67	S.	*Flabellum transversale* *Flabellum* cf. *distinctum* *Deltocyathus orientalis*
545	36 07 52	135 47 05	July 8	15:20	311	28.3	25.4	10.6	24.14	25.26	M.	*Flabellum distinctum*
546	35 48 30	135 51 35	July 20	7:15	101	26.1	25.2	13.0	24.15	25.53	s.M.G.	*Fragilocyathus conotrochoides*
549	36 13 00	135 42 30	do	13:20	115	27.4	26.6	15.6	24.58	25.70	R.	*Flabellum transversale conicum* *Caryophyllia japonica* **Dendrophyllia japonica* **Dendrophyllia arbuscula* **Dendrophyllia* sp. *Balonophyllia fistula* *Balanophyllia* sp. aff. *B. cornucopia*
553	36 35 15	136 17 00	July 21	11:00	113	27.4	26.9	18.0	23.88	25.54	s.M.	*Fragilocyathus conotrochoides* *Deltocyathus orientalis* *Flabellum* sp. (Young specimen) *Deltocyathus orientalis*
572	37 52 55	137 00 45	July 27	16:50	132	26.1	26.3	16.8	24.86	25.70	R.	*Fragilocyathus conotrochoides* *Flabellum transversale*
575	37 48 00	137 18 00	July 28	10:05	123	27.8	25.2	16.8	25.26	25.68	S.	*Balanophyllia rediviva*
576	37 49 45	137 32 00	do	12:00	344	26.6	26.7	1.5	25.85	25.38	M.	*Flabellum transversale*
580	37 17 50	137 17 10	July 29	10:00	135	27.5	26.8	14.2	24.52	25.68	S.	*Flabellum distinctum* *Caryophyllia japonica* **Dendrophyllia japonica* **Dendrophyllia* sp.
581	37 11 30	137 09 15	do	11:45	207	28.1	27.1	8.3	24.37	25.41	S.	**Dendrophyllia* sp.
584	36 48 30	137 15 00	July 30	11:45	212	28.1	27.8	7.5	21.60	25.40	P.M.	**Madrepora* cf. *oculata* **Dendrophyllia japonica*
591	37 27 45	138 20 50	Aug. 3	8:17	311	26.7	26.4	2.0	24.21	25.28	R.	**Dendrophyllia* cf. *japonica* **Dendrophyllia* cf. *arbuscula* **Dendrophyllia* sp.
595	37 44 10	138 12 15	Aug. 8	10:15	145	31.3	27.5	15.2	24.82	25.61	R.	**Madrepora* cf. *oculata* *Caryophyllia japonica* *Balanophyllia* cf. *fistula* **Dendrophyllia* cf. *arbuscula*
600	38 33 37	138 21 50	Aug. 9	13:15	168	27.5	27.7	9.5	24.73	25.41	c.S.	*Caryophyllia japonica*
608	39 04 32	138 43 45	Aug. 10	11:45	150	28.0	27.1	15.2	24.91	25.49	R.	*Caryophyllia japonica*
610	38 52 33	139 02 50	do	18:30	145	26.8	27.1	11.9	24.82	25.47	R.	*Caryophyllia japonica* **Madrepora* cf. *oculata* **Dendrophyllia* cf. *arbuscula*
620	39 22 05	139 35 40	Aug. 15	6:45	139	26.5	27.5	2.9	24.95	25.47	R.	**Dendrophyllia japonica*
621	39 16 00	139 49 45	do	8:35	93	26.3	27.4	16.4	24.43	25.55	s.M.	*Deltocyathus orientalis* *Flabellum distinctum* *Flabellum transversale*

Station No.	Position		Date	Time of Day	Depth in meter	Air temp. C	Water Temp. C		Specific gravity S		Character of bottom	Deep Water Corals
	N. Latitude	E. Longitude					Surface	Bottom	Surface	Bottom		
624	39° 36′ 30″	139° 53′ 11″	Aug. 15	12:30	73	30.3	27.6	20.3	23.59	25.50	S.M.	*Flabellum* cf. *distinctum*
628	39 39 20	139 31 45	Aug. 17	11:01	148	29.7	27.1	12.6	24.11	25.61	S.	*Flabellum transversale*
637	40 20 37	139 35 30	Aug. 18	12:05	145	28.8	27.4	12.3	24.79	25.50	s.G.	*Caryophyllia japonica* **Madrepora* cf. *oculata* **Dendrophyllia japonica*
638	40 31 15	139 30 45	do	15:00	73	27.7	27.8	16.6	24.83	25.65	R.	*Flabellum transversale* *Balanophyllia* cf. *italica*
639	40 26 30	139 46 00	do	16:04	196	28.4	27.1	12.2	24.76	25.47	G.	*Flabellum transversale*
645	41 06 17	140 09 15	Aug. 22	12:40	115	26.8	26.8	14.4	24.54	25.59	m.S.Sh.	*Flabellum transversale*
647	41 07 30	140 03 00	Aug. 23	6:45	86	25.7	26.7	18.2	24.68	25.62	R.	*Balanophyllia italica* **Dendrophyllia arbuscula*
652	41 27 08	140 23 00	Aug. 24	8:02	110	27.1	23.4	14.0	25.03	25.52	G.	*Fragilocyathus conotrochoides*

2. Husa-maru[1]—collection

Surveying ship of the Tiba Prefectural Fisheries Experimental Station, at Tateyama-Hozyô-mati.[2] Dredge operation prosecuted during 1930–1932, and is chiefly in the shallow seas between the northern and southern tips of the Pacific side of Tiba[3]-ken. Some of the Sôyô-maru stations also cover this area, but the present material comprises specimens from shallower water.

Station No.	Localities	Depth in metres	Water Temp. in C.		Simple Corals
			Surface	Bottom	
42	N. of Taitô-zaki[4]	15.4	23.8	20.2	*Flabellum* sp. *Stephanophyllia fungulus*
48	Katu-ura[5] Bay	17	22.5	16.5	*Flabellum transversale*
25	Off E. of Kido[6]	39	—	—	*Heterocyathus japonicus*
44	Off NE. of Taitô-zaki	104	20.7	13.8	*Cyathoceras niinoi* *Ceratotrochus* sp. *Bathyactis palifera* (*Diaseris*-form) *Balanophyllia* sp.
45	Off E. of Taitô-zaki	130.5	25.1	13.0	*Flabellum distinctum* *Flabellum rubrum* *Flabellum transversale* *Flabellum* sp. (Juvenile) *Caryophyllia japonica* *Caryophyllia* sp. *Anthemiphyllia dentata* *Balanophyllia gigas* *Balanophyllia rediviva* *Stephanophyllia formosissima* *Stepnanophyllia fungulus*
85	Between Minami-Asai[7] and Nozima-zaki[8]	130–147	26.0	14.2	*Flabellum* sp. *Caryophyllia japonica* *Caryophyllia* sp. *Balanophyllia* sp. *Stephanophyllia formosissima*
81	Off S.W. of Wada[9]	152–154	26.7	12.6	*Flabellum* sp. *Balanophyllia gigas*
54	Off S. of Ubara[10]	150	21.0	13.6	*Caryophyllia scobinosa* *Deltocyathus orientalis* *Endopachys japonicum* *Balanophyllia* sp.
53	Off S. of Ubara	130–177	21.9	13.3	*Flabellum transversale* *Flabellum* sp. *Caryophyllia* sp. *Deltocyathus orientalis*

1) 房丸　2) 館山北條町　3) 千葉　4) 太東崎　5) 勝浦　6) 木戸　7) 南朝夷　8) 野島崎　9) 和田　10) 鵜原

Eleven of the 90 stations have yielded corals, but simple corals were gained from only the 9 stations listed above.

3. Sititô-maru[1]—collection

Surveying ship of the Tôkyô Fisheries Experimental Station. Dredge operation prosecuted during August 6–22, 1935; the area is restricted to near the Zenisu-gyôsyô,[2] a small group of reefs lying to south of Izu[3] Peninsula, Sizuoka-ken[4]. The collection contains many colonial non-reef-building corals, but few simple corals.

Station No.	E. Longitude	N. Latitude	Depth in metres	Bottom characters	Simple Corals
7	138° 48′ 12″	33° 54′ 24″	80	rocky, with gravel, sand	*Balanophyllia* cf. *cumingii* *Balanophyllia* sp. *Flabellum distinctum*
3	138 50 00	33 55 36	107	rocky, with gravel, sand	*Flabellum distinctum* *Flabellum rubrum debile*
6	138 52 24	33 52 52	145	rocky, with gravel	*Deltocyathus orientalis* *Balanophyllia fistula*
10	138 56 36	33 56 36	155	rocky	*Balanophyllia fistula*

Stylasterinae, *Dendrophyllia* and *Alveopora* are represented by many species from the stations (St. 2, 3, 6, 7, 10, 11, 12, 13), they are not treated in this work.

4. Hukui-maru[5]—collection

Surveying ship of the Hukui Prefectural Fisheries Experimental Station at Hukui. Dredge operation prosecuted during December 1936, August 1937, and September 1937. Many specimens of deep water corals are obtained, most of them are *Dendrophyllia japonica*, *Dendrophyllia arbuscula* and a Hydrozoan, *Allopora boreopacifica*. They are not treated in this paper. The following is the list of the simple corals obtained by the Hukui-maru from the sea near the Wakasa Bay.

Balanophyllia aff. *affinis* (SEMPER), St. 5, 9, 45, 6.
Balanophyllia cf. *cumingii* MILNE EDWARDS & HAIME, St. 3, 18, 15, 17, 16, 21.
Balanophyllia sp. St. 2, 5, 6, 9, 21, 28, 29, 33, 40, 41, 43, 9a.
Caryophyllia japonica v. MARENZELLER, St. 28, 1, 18.
Deltocyathus orientalis DUNCAN, St. 30, 34, 41, 53, 6, 7, 13, 10, 6, 8, 53, 694, 688, 702, 692, 18, 39, 20, 15, 28, 29, 10, 778, 1093, 947, 582, 693, 815, 691, 589.
Flabellum transversale MOSELEY, St. 2, 3, 4, 5, 9, 7, 13, 14, 19, 20, 21, 22, 23, 26, 34, 39, 44, 47, 48, 2, 10, 5, 7, 8, 10, 7′, 11, 25, 18, 1, 13, 16, 28, 2, 10, 2.
Flabellum sp. St. 8, 14, 13, 25, 7, 18.
Fragilocyathus conotrochoides YABE & EGUCHI, St. 6, 2, 16.
Premocyathus compressus YABE & EGUCHI, St. 582, 688, 691, 692, 778, 805, 815, 1093, 1105, 6, 26.
Rhizotrochus niinoi YABE & EGUCHI, St. 20, 16, 28.

The station numbers in the next list are from Mr. H. NIINO, who commanded the surveying ship Hukui-maru and studied the oceanographical conditions.

Station No.	E. Longitude	N. Latitude	Depth in metres	Simple Corals
2	135° 42′ 12″	36° 11′ 51″	109	*Balanophyllia affinis*
3	135 43 12	36 12 18	64	*Flabellum transversale* *Balanophyllia* cf. *italica*
4	135 44 18	36 12 48	38	*Flabellum transversale*
5	135 45 12	36 13 20	58	*Flabellum transversale* *Balanophyllia affinis*
8	135 44 36	36 14 14	115	*Flabellum transversale* *Balanophyllia fistula*
9	135 43 36	36 13 36	114	*Flabellum transversale*
14	135 45 00	36 12 12	100	*Flabellum transversale*

1) 七島丸　2) 銭州漁礁　3) 伊豆　4) 靜岡縣　5) 福井丸

VI. LISTS OF THE FOSSIL CORALS ACCORDING TO LOCALITIES

Kwantô[1]-District, Honsyû[2], Japan

1. Ibaraki[3]-ken

1. Coast, South of Turusi-zaki, near Hitati-mati,[4] Taga-gun.
   - *Deltocyathus orientalis* — Reg. No. 38660.
2. Aozyûku, Ami-mura, Inatori-gun.[5]
   - *Heterocyathus japonicus* — Reg. No. 15157.

2. Tiba-ken

1. Oti-Simo-Sinden (Semata), Sitô-mura, Sanbu-gun.[6]
   - *Flabellum transversale* — Reg. Nos. 7958, 42936.
   - *Heterocyathus aequicostatus* — Reg. No. 60752.
   - *Heterocyathus japonicus* — ,, 60369.
   - *Deltocyathus orientalis* — Reg. Nos. 41016, 41015.
2. Ônari, Ontu-mura, Itihara-gun.[7]
   - *Bathyactis* ? sp. — Reg. No. 38359.
   - *Deltocyathus orientalis* — ,, 38659.
3. Matate (Gara), Toda-mura,[8] Itihara-gun.
   - *Flabellum transversale* — Reg. No. 7963.
4. Nisi-Kuniyosi, Usiku-mati,[9] Itihara-gun.
   - *Deltocyathus orientalis* — Reg. No. 50018.
5. Katamataki, Anegasaki-mati, Itihara-gun.[10]
   - *Heterocyathus japonicus* — Reg. No. 60365.
6. W. of Hukazyô,[11] Anegasaki-mati, Itihara-gun.
   - *Heterocyathus japonicus* — Reg. No. 60402.
7. Iriyamazu,[12] Anegasaki-mati, Itihara-gun.
   - *Flabellum transversale* — Reg. No. 51001.
8. Zizôdô, Makuta-mura,[13] Kimitu-gun.
   - *Flabellum transversale* — Reg. Nos. 7964, 39733.
   - *Premocyathus compressus* — Reg. Nos. 60368, 38346.
   - *Caryophyllia* cf. *japonica* — Reg. No. 38293.
   - *Deltocyathus orientalis* — ,, 50019.
   - *Heterocyathus aequicostatus* — ,, 38361.
   - *Bathyactis palifera* — ,, 38361.
   - *Stephanophyllia fungulus* — ,, 38287.
9. Atebi,[14] Makuta-mura, Kimitu-gun.
   - *Flabellum transversale* — Reg. Nos. 41934, 50586, 41938.
   - *Deltocyathus orientalis* — Reg. No. 50014.
   - *Endopachys japonicum* — ,, 41929.
10. Mariya,[15] Makuta-mura, Kimitu-gun.
   - *Flabellum transversale* — Reg. No. 41937.
11. W. of Tanbara,[16] Makuta-mura, Kimitu-gun.
   - *Heterocyathus japonicus* — Reg. No. 60384.
12. Iwade, Obitu-mura,[17] Kimitu-gun.
   - *Caryophyllia* sp. — Reg. No. 38294.
   - *Caryophyllia* sp. — ,, 50532.
   - *Bathyactis* ? sp. — ,, 41288.

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1) 關東　2) 本州　3) 茨城縣　4) 多賀郡日立町ツルシ崎　5) 稻取郡阿見村青宿　6) 山武郡市東村越智下新田(瀨又)
7) 市原郡溫津村大成　8) 戶田村馬立(俗稱ガラ)　9) 牛久町西國吉　10) 市原郡姉ヶ崎町片又木　11) 深城　12) 不入斗
13) 馬來田村地藏堂　14) 當日　15) 眞里谷　16) 丹原　17) 小櫻村岩田

13. Takadaki, Oikawa-mura, Isumi-gun.[1]
Deltocyathus orientalis Reg. No. 50020.

14. Mimata, Husamoto-mura,[2] Isumi-gun. (Kiwada[3] beds)
Stephanophyllia fungulus Reg. No. 41017.

15. Valley north of Ôwasi, Naka-mura,[4] Kimitu-gun.
Premocyathus compressus Reg. No. 60363.
Deltocyathus orientalis ,, 50017.
Heterocyathus aequicostatus ,, 60400.
Stephanophyllia fungulus ,, 41014.

16. Ôwasi, Naka-mura, Kimitu-gun.
Deltocyathus orientalis Reg. No. 50016.
Heterocyathus japonicus ,, 60399.

17. Ôi,[5] Naka-mura, Kimitu-gun.
Flabellum transversale Reg. No. 41933.
Heterocyathus japonicus ,, 60418.

18. Ôyatu, Koito-mura,[6] Kimitu-gun.
Flabellum transversale Reg. No. 7959.
Deltocyathus orientalis ,, 38291.
Heterocyathus aequicostatus ,, 23636.
Heterocyathus japonicus ,, 15172.

19. Nisi-Yatu,[7] Koito-mura, Kimitu-gun.
Stephanophyllia fungulus Reg. No. 38288.

20. Sirataki, near Kanôsan,[8] Kimitu-gun.
Caryophyllia sp. Reg. Nos. 38258, 38253.

21. Nisi-Higasa, Akimoto-mura,[9] Kimitu-gun.
Flabellum transversale Reg. No. 43440.
Caryophyllia sp. ,, 50533.
Deltocyathus orientalis ,, 29315.
Stephanophyllia fungulus ,, 41012.

22. E. of Nisi-Higasa, Akimoto-mura, Kimitu-gun.
Deltocyathus orientalis Reg. No. 38661.

23. N. of Sanuki-mati,[10] Kimitu-gun.
Flabellum transversale Reg. No. 39737.

24. Sasage,[11] Sanuki-mati, Kimitu-gun.
Flabellum transversale Reg. No. 7960.
Heterocyathus japonicus ,, 15176.
Caryophyllia sp. ,, 38260.
Heteropsammia cf. *ovalis* (once recorded by Dr. MAKIYAMA)
Heterocyathus aequicostatus (,,)

25. N. of Minato-mati,[12] Kimitu-gun.
Heterocyathus japonicus Reg. No. 7088.

26. Road between Seki[13] and Minato-mati, Kimitu-gun.
Caryophyllia sp. Reg. Nos. 38293 (Nokogiri-yama beds), 38250 (Umegase beds)

27. S. of Sanuki-mati, Kimitu-gun.
Caryophyllia sp. Reg. No. 38347.

28. Nagahama,[14] Minato-mati, Kimitu-gun.
Caryophyllia sp. Reg. No. 38671.
Ceratotrochus sp. ? ,, 38365.

1) 夷隅郡老川村高瀧 2) 總元村三又 3) 黄和田 4) 中村大瓶 5) 大井 6) 小糸村大谷 7) 西谷 8) 鹿野山附近白瀧
9) 秋元村西日笠 10) 佐貫町 11) 笹毛 12) 湊町 13) 關 14) 長濱

29. Upper course of Motona-gawa, Hota-mati, Awa-gun.[1]
Discotrochus (*Cylindrophyllia*) *minimus* Reg. No.50547.

30. W. of Nakanuma, Nago-mati,[2] Awa-gun. (Kiwada beds)
Flabellum transversale Reg. Nos. 50585, 41935, 43438.

3. Kanagawa-ken[3] and Tokyo-hu

Tokyo-hu[4]

1. Sinagawa,[5] Tôkyô.
Heterocyathus japonicus Reg. Nos. 7089, 7068.

2. Takinogawa,[6] Tôkyô.
Heterocyathus japonicus Reg. No. 7089.
Caryophyllia sp. ,, 38261.

Kanagawa-ken

3. Yatu, Kanazawa-mura, Kuraki-gun.[7]
Bathyactis ? sp. Reg. No. 38352.

4. E. of Enkai-zan (Hitorizawa), Muturanosyô-mura,[8] Kuraki-gun.
Caryophyllia sp. Reg. No. 38257.
Deltocyathus orientalis ,, 38463.

5. W. of Sanbu,[9] Muturanosyô-mura, Kuraki-gun.
Deltocyathus orientalis Reg. No. 38348.

6. Kosiba,[10] Kanazawa-mati, Kuraki-gun.
Flabellum rubrum Reg. No. 7961.

7. Kuge, Yokosuka-si,[11] Kanagawa-ken.
Flabellum transversale Reg. No. 39726.
Heterocyathus japonicus ,, 15175.

8. Kami-Kurata-omote, Toyota-mura, Kamakura-gun.[12]
Oulangia stokesiana miltoni Reg. No. 43421.

9. Ôkine, Nagai-mura, Miura-gun.[13]
Deltocyathus orientalis Reg. No. 38203.

10. Simo-Miyata, Hatuse-mura,[14] Miura-gun.
Heterocyathus japonicus Reg. No. 23637.

11. Wada,[15] Simo-Miyata, Hatuse-mura, Miura-gun.
Heterocyathus japonicus Reg. No. 15171.

12. Harasita,[16] Simo-Miyata, Hatuse-mura, Miura-gun.
Flabellum transversale Reg. No. 50846.

13. Ninomiya, Azuma-mura, Naka-gun.[17]
Flabellum transversale Reg. No. 7962.

14. S. of Musikubo, Kokuhu-mura[18] Naka-gun.
Deltocyathus orientalis Reg. No. 39201.

1) 安房郡保田町元名川上流 2) 那古町中沼 3) 神奈川縣 4) 東京府 5) 品川 6) 瀧ノ川 7) 久良岐郡金澤村谷津 8) 六浦莊村圓海山 (氷取澤) 9) 山部 10) 小柴 11) 横須賀市公鄕 12) 鎌倉郡豐田村上倉田表 13) 三浦郡長井村大木根 14) 初聲村下宮田 15) 和田 16) 原下 17) 中郡吾妻村二ノ宮 18) 國府村蟲窪

Tôhoku[1]-Region, Honsyû

1. Aomori-ken[2]

1. Komatazawa, Sônai-mura, Kita-Tugaru-gun.[3] (Ôta beds[4]; Miocene)
   Flabellum cf. *pavoninum* Reg. No. 43429.

2. Hukusima-ken[5]

1. Matubara, Mutuai-mura, Date-gun.[6] (Yanagawa[7] beds; Miocene)
   Flabellum cf. *pavoninum* Reg. No. 38610.
2. NE. Valley of Yamabo, Uno-mura,[8] Date-gun. (Yanagawa beds; Miocene)
   Flabellum cf. *pavoninum* Reg. No. 38611.

Tôkaido[9], Central Part of Honsyû

Sizuoka-ken[10]

1. W. of Tôsyôgû and Nakahiramatu, Kunô-mura, Abe-gun.[11]
   Flabellum distinctum Reg. Nos. 50865, 7957, 43417.
2. Hosoya, Haranotani-mura, Ogasa-gun.[12]
   Heterocyathus aequicostatus Reg. Nos. 60401, 60375.
   Heterocyathus japonicus „ 28723.
3. Tonbe, Taruki-mura,[13] Ogasa-gun.
   Flabellum rubrum Reg. No. 29233.
   Heterocyathus japonicus „ 29308.
4. Nitô, near Kakegawa-mati,[14] Ogasa-gun.
   Flabellum distinctum Reg. No. 28902.

Sikoku[15]

1. Tônohama, Yasuda-mura, Aki-gun, Kôti-ken[16] (Tônohama beds; Pliocene).
   Flabellum distinctum Reg. Nos. 50584, 43439, 43436, 43435.
   Flabellum rubrum „ 43434.
   Deltocyathus orientalis „ 50008.
   Acanthocyathus malayicus „ 50523.
2. Ôno,[17] Yasuda-mura, Aki-gun, Kôti-ken (Tônohama beds; Pliocene).
   Flabellum distinctum Reg. No. 41932.

Kyûsyû[18]

1. Segoe near Aya-mura, Higasi-Morokata-gun, Miyazaki-ken.[19]
   Odontocyathus japonicus Reg. No. 40876.
2. Unoki and Kuwanomaru, Yosika-mura, Kagosima-gun, Kagosima-ken.[20]
   Deltocyathus orientalis Reg. No. 65019.
   Heteropsammia cf. *ovalis* „ 65018.

Ryûkyû[21] Islands

1. Plateau of Kamikatetu, Kikai-zima, Ôsima-gun,[22] Kagosima-ken (Ryûkyû limestone).
   Flabellum rubrum Reg. No. 39744.

1) 東北 2) 青森縣 3) 北津輕郡相内村小股澤 4) 太田層 5) 福島縣 6) 伊達郡睦合村松原 7) 梁川 8) 湯野村山坊 9) 東海道 10) 靜岡縣 11) 安倍郡久能村, 東照宮ノ西及ビ中平松 12) 小笠郡原ノ谷村細谷 13) 垂木村富部 14) 掛川町, 仁藤 15) 四國 16) 高知縣安藝郡安田村唐ノ濱 17) 大野 18) 九州 19) 宮崎縣東諸縣郡綾村瀨越 20) 鹿兒島縣鹿兒島郡吉田村鵜木, 桑ノ丸 21) 琉球 22) 大島郡喜界島上嘉鐵

Flabellum rubrum debile	Reg. No.
Flabellum distinctum	,, 39735.
Flabellum transversale	,, 60822.
**Ceratotrochus (Conotrochus) elongatus*	,, 60757.
**Caryophyllia paucipaliata*	,, 60740.
Premocyathus compressus	,, 60747.
Goniocyathus pacificus	,, 60731.
Citharocyathus conicus	,, 60738.
**Peponocyathus orientalis*	,, 43423.
Trochocyathus pileus	,, 60738.
Trochocyathus (Tropidocyathus) lessoni	,, 60743.
**Trochocyathus (Thecocyathus) hanzawai*	,, 60748.
Deltocyathus orientalis	,, 50009.
Heterocyathus aequicostatus	Reg. Nos. 60737, 53657, 53656, 53655, 53658.
Anthemiphyllia dentata	Reg. No. 50021.
**Bathyactis kikaiensis*	,, 50097.
Bathyactis symmetrica	,, 60734.
Stephanophyllia fungulus	,, 43424.
Stephanophyllia (Letepsammia) formosissima	,, 60421.
**Stephanophyllia (Letepsammia) japonica*	,, 50236.
Endopachys japonicum	,, 58986.
Balanophyllia fistula	,, 60741.
Balanophyllia cf. *cumingii*	,, 58984.
Balanophyllia cf. *imperialis*	,, 58940.
Balanophyllia sp.	,, ,,
**Heteropsammia ovalis japonica*	,, 60739.

Those marked with an atrisk are extinct species.

2. Kotinda, Kotinda-mura, Okinawa-sima[1] (Simaziri[2] group; pliocene).
   Deltocyathus orientalis Reg. No. 39215.
3. Okinawa-zima, precise locality unknown (Ryûkyû limestone).
   Flabellum aff. *pavoninum* Reg. No. 8347.

Taiwan[3] (Formosa)

Mostly from the Byoritu-beds

A. Sintiku-syû[4]

1. 1000 m. NW. of Kwatusuikwa, Kobokô, Byôritu-gun.[5]
   Heterocyathus aequicostatus Reg. No. 39240.
2. 1200 m. SE. of Sankwakô, Tusyô-syô,[6] Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 60374.
3. Sankwakô, Tusyô-syô, Byôritu-gun. (Mr. ANDÔ's loc. 38)
   Flabellum rubrum debile Reg. Nos. 39283, 39270.
4. 550 m. E. of Sankwakô, Byôritu-gun (Mr. ANDÔ's loc. 43).
   Flabellum rubrum debile Reg. No. 39249.
5. 1500 m. E. of Sinpo,[7] Tûsyô-syô, Byôritu-gun. (Mr. ANDÔ's loc. 67).
   Flabelum rubrum debile Reg. No. 60379.
6. 1520 m. E. of Sinpo, Tûsyô-syô, Byôritu-gun (Mr. ANDÔ's loc. 68).
   Flabellum rubrum debile Reg. No. 39269.

1) 沖繩島東風平村東風平　2) 島尻層　3) 臺灣　4) 新竹州　5) 苗栗郡鴨母坑關水窩　6) 通霄庄三窩口　7) 新埔

7. 1000 m. E. of Zyô-tûsyôwan,[1] Tûsyô-syô, Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 60372.
8. 1200 m. E. of Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 39284.
9. 600 m. SE. of Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 60391.
10. 550 m. SE. of Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 60396.
11. 550 m. SE. of Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun.
   Discotrochus (*Cylindrophyllia*) *minimus* Reg. No. 60395.
12. 400 m. SE. of Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun.
   Heteropsammia cochlea alta Reg. No. 41050.
   Discotrochus (*Cylindrophyllia*) *minimus* ,, 60360.
13. 510 m. SE. of Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 43431.
   Heteropsammia ovalis formosensis ,, 41048.
   Discotrochus (*Cylindrophyllia*) *minimus* ,, 30361.
14. Zyô-tûsyôwan, Tûsyô-syô, Byôritu-gun. ,, 30361.
   Flabellum rubrum debile Reg. No. 43426.
15. 900 m. SE. of Naikotô,[2] Tûsyô-syô, Byôritu-gun.
   Heterocyathus japonicus Reg. No. 60364.
   Heterocyathus aequicostatus ,, 60366.
   Flabellum rubrum debile ,, 43427.
16. Naikotô, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 43427.
17. 1000 m. SE. of Naikotô, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 39278.
18. Tyû-tûsyôwan,[3] Tûsyô-syô, Byôritu-gun (Mr. ANDÔ's loc. 48).
   Flabellum rubrum debile Reg. No. 39282.
19. 900 m. NW. of Keiyukwa,[4] Tûsyô-syô, Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 39244.
20. 940 m. NW. of Keiyukwa, Tûsyô-syô, Byôritu-gun.
   Flabellum rubrum debile Reg. No. 39280.
21. E. of Kwassuikwa, Omoko, Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 39248.
22. Between Kôsui and Zyuna, Tiseikwa,[5] Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 38194.
23. 1450 m. W. of Tikô, Tazimabokô,[6] Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 60367.
24. 900 m. NW. of Kwassuikwa, Omoko, Byôritu-gun.
   Heterocyathus aequicostatus Reg. No. 39246.
25. S. of Bôsiho, Siko-syô[7] Byôritu-gun.
   Deltocyathus orientalis Reg. No. 38263.
   Bathyactis ? sp. ,, 38353.
26. E. of Goko, Dora-syô[8] Byôritu-gun.
   Flabellum rubrum debile Reg. No. 38191.
27. Syôgun-yama, Byôritu-gai,[9] Byôritu-gun.
   Heteropsammia ovalis formosensis Reg. No. 38193.

1) 上通霄灣 2) 內湖島 3) 中通霄灣 4) 鷄油窩 5) 地勢窩甲水, 樹那 6) 田烏母坑地坑 7) 四湖庄茅子埔
8) 銅鑼庄五湖 9) 苗栗街將軍山

28. 700 m. E. of Hakusyaton, Goryû-syô, Tikunan-gun.[1]
Heterocyathus aequicostatus Reg. No. 60370.
Discotrochus (*Cylindrophyllia*) *minimus* „ 50011.
Flabellum rubrum debile „ 43437.

29. 1100 m. NE. of Hakusyaton, Goryû-syô, Tikunan-gun.
Flabellum rubrum debile Reg. No. 43433.

30. 1000 m. SE. of Hakusyaton, Goryû-syô, Tikunan-gun.
Flabellum rubrum debile Reg. No. 39268.
Discotrochus (*Cylindrophyllia*) *minimus* Reg. Nos. 60382, 60390.

31. Hakusyaton, Goryû-syô, Tikunan-gun.
Heterocyathus aequicostatus Reg. Nos. 59545, 60398.
Flabellum rubrum debile Reg. No. 59519.

32. 300 m. E. of Hakusyaton, Goryû-syô, Tikunan-gun.
Heterocyathus japonicus Reg. No. 38289.

33. 1200 m. N. of Hakusyaton, Goryû-syô, Tikunan-gun.
Flabellum rubrum Reg. No. 59520.

34. Goryû-syô, Tikunan-gun.
Flabellum rubrum debile Reg. No. 39273.

35. Nanseizan,[2] Goryû-syô, Tikunan-gun.
Flabellum rubrum debile Reg. No. 43432.

36. 700 m. NE. of Nanseizan, Goryû-syô, Tikunan-gun.
Flabellum rubrum debile Reg. Nos. 43430, 41939.
Discotrochus (*Cylindrophyllia*) *minimus* Reg. No. 60393.

37. 950 m. SW. of Daikwa,[3] Goryû-syô, Tikunan-gun.
Heterocyathus aequicostatus Reg. Nos. 39206, 39193.
Heteropsammia cochlea alta Reg. No. 39204.

38. E. of Kityô,[4] Goryû-syô, Tikunan-gun.
Discotrochus (*Cylindrophyllia*) *minimus* Reg. No. 50023.

39. W. of Dairyô,[5] Goryû-syô, Tikunan-gun.
Discotrochus (*Cylindrophyllia*) *minimus* Reg. No. 50022.

40. Wanga,[6] Goryû-syô, Tikunan-gun. (Mr. ANDÔ's loc. 17).
Flabellum rubrum debile Reg. Nos. 43428, 39274, 39281, 39279, 39101.
Flabellum cf. *multifore* Reg. No. 41052.
Heterocyathus aequicostatus „ 39231.
Discotrochus (*Cylindrophyllia*) *minimus* Reg. Nos. 50012, 60381, 60383, 60385.

B. Tainan-syu[7]

41. Kanpokô, Gyokusei-syô, Sinkwa-gun.[8]
Endopachys japonicum Reg. No. 41930.
Hetreocyathus aequicostatus „ 56581.

42. W. of Yamamibasi, Gyokusei, Satin-syô,[9] Sinkwa-gun.
Ceratotrochus ? sp. Reg. No. 50541.

43. Sôkeisi, Miyada-syô, Sobun-gun.[10]
Flabellum distinctum Reg. No. 60394.

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1) 竹南郡後龍庄白沙屯 2) 南勢山 3) 大窩 4) 崎頂 5) 大寮 6) 灣瓦 7) 臺南州 8) 新化郡玉井庄芋寮口
9) 左鎭庄玉井, 山見橋 10) 曾文郡官田庄雙溪子

C. Takao-syû[1]

44. Mud-volcano of Konsuihei, Kyôsitô, Okayama-gun.[2]
Heterocyathus aequicostatus Reg. No. 60371.
Heteropsammia michelinii „ 41049.

45. Raised coral reef: S. of Sisitô, Kôsyun-gun.[3]
Heterocyathus aequicostatus Reg. No. 38461.

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Explanation of Plate IX (I)

(a, lateral view; b, calicular view; c, basal view)

Figs. 1–3. *Desmophyllum dianthus* (ESPER); nat. size. Loc. off Misaki, Kanagawa-ken. Reg. No. 43412.

Fig. 4. *Desmophyllum* cf. *alabastrum* ALCOCK; nat. size. Loc. Sôyô-maru St. 288, Seno-umi. Reg. No. 59132.

Figs. 5, 6. *Desemophyllum* cf. *insigne* DUNCAN; nat. size. Fig. 5, Loc. off Misaki, Kanagawa-ken. Reg. No. 43413. Fig. 6, Loc. off Kuki, Sima-gun, Mie-ken. Reg. No. 50521.

Fig. 7. *Desmophyllum delicatum* YABE & EGUCHI, n. Fig. 7a, nat. size; Fig. 7b, × 2. Loc. Sôyô-maru St. 22, off Siwoya-zaki, Hukusima-ken. Reg. No. 59131.

Fig. 8. *Cyathoceras diomedae* VAUGHAN; nat. size. Loc. Sôyô-maru St. 331, off Asizurizaki, Kôti-ken. Reg. No. 53694.

Fig. 9. *Cyathoceras niinoi* YABE & EGUCHI, n.; ×2. Loc. Husa-maru St. 41, off Taitô-zaki, Tiba-ken. Reg. No. 59070.

Fig. 10. *Ceratotrochus hiugaensis* YABE & EGUCHI, n. Fig. 10a, ×2; Fig. 10b, ×3. Loc. Sôyô-maru St. 315, off Ôsima, Miyazaki-ken. Reg. No. 50246.

Fig. 11. *Ceratotrochus* (*Conotrochus*) *funicolumna* ALCOCK. Fig. 11a, × 15; Fig. 11b, × 2. Loc. Sôyô-maru St. 268, off Izu penninsula. Reg. No. 50243.

Fig. 12. *Ceratotrochus* (*Conotrochus*) *parahispidus* YABE & EGUCHI, n. Fig. 12a, nat. size; Fig. 12b, × 2. Loc. Sôyô-maru St. 323, Bungo suidô. Reg. No. 50247.

Figs. 13, 14. *Ceratotrochus* (*Conotrochus*) *elongatus* YABE & EGUCHI; × 2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60757.

Fig. 15. *Fragilocyathus conotrochoides* YABE & EGUCHI. Fig. 15a, ×1.5; Fig. 15b, ×3. Loc. Sôyô-maru St. 572, off Noto peninsula. Reg. No. 53676.

Fig. 16. *Placotrochides* ? *kikutii* YABE & EGUCHI; × 3. Loc. Toyama Bay. Reg. No. 63088.

Kimura photo.

Explanation of Plate X (II)

(a, lateral view; b, calicular view; c, basal view)

Figs. 1–3. *Caryophyllia japonica* v. MARENZELLER. Fig. 1a, nat. size; Fig. 1b, × 2. Loc. Sôyô-maru St. 270, off Misaki, Sagami Bay. Reg. No. 59004. Fig. 2a, × 1.5; Fig. 2b, × 2. Loc. Sôyô-maru St. 331, off Murotozaki, Kôti-ken. Reg. No. 59011. Fig. 3a, × 1.5; Fig. 3b, × 3. Loc. Sôyô-maru St. 262, Sagami Bay. Reg. No. 59012.

Figs. 4, 5. *Caryophyllia scobinosa* ALCOCK. Fig. 4a, nat. size; Fig. 4b, × 2. Loc. Sôyô-maru St. 336, Tosa Bay. Reg. No. 53628. Fig. 5a, × 1.5; Fig. 5b, × 2. Loc. Sôyô-maru St. 220, off Muroto-zaki, Kôti-ken. Reg. No. 53634.

Figs. 6, 7. *Caryophyllia scobinosa decapali* YABE & EGUCHI, n. Fig. 6a, × 1.5; Fig. 6b, × 3. Loc. Sôyô-maru St. 210, off Seto, Wakayama-ken, Reg. No. 53640. Fig. 7a, × 1.5; Fig. 7b, × 2. Loc. Sôyô-maru St. 222, Tosa Bay, Kôti-ken. Reg. No. 53636.

Fig. 8. *Caryophyllia* cf. *alcocki* VAUGHAN. Fig. 8a, nat. size; Fig. 8b, × 2. Loc. Sôyô-maru St. 223, Tosa Bay. Reg. No. 53625.

Figs. 9–11. *Caryophyllia paucipaliata* YABE & EGUCHI; × 2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60740.

Fig. 12. *Caryophyllia paraoctopali* YABE & EGUCHI, n. Fig. 12a, × 2; Fig. 18b, × 3. Loc. off Hosozima, Miyazaki-ken. Reg. No. 53647.

Figs. 13, 14. *Premocyathus compressus* YABE & EGUCHI. Figs. 13a, 13b, × 2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60747. Fig. 14a, × 2; Fig. 14b, × 3. Loc. Sôyô-maru St. 332, off Asizuri-zaki, Kôti-ken. Reg. No. 53642.

Figs. 15, 16. *Goniocyathus pacificus* YABE & EGUCHI. Fig. 15, lateral view, × 1.5. Loc. Sôyô-maru St. 198, off Ise. Reg. No. 50086. Fig. 16a, ×2; Fig. 16b, ×2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60731.

Figs. 17, 18. *Citharocyathus conicus* ALCOCK. Fig. 17a, × 2; Fig. 17 b, × 2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60738. Fig. 18a, × 2; Fig. 18b, × 3. Loc. Sôyô-maru St. 322, Bungo suidô. Reg. No. 53685.

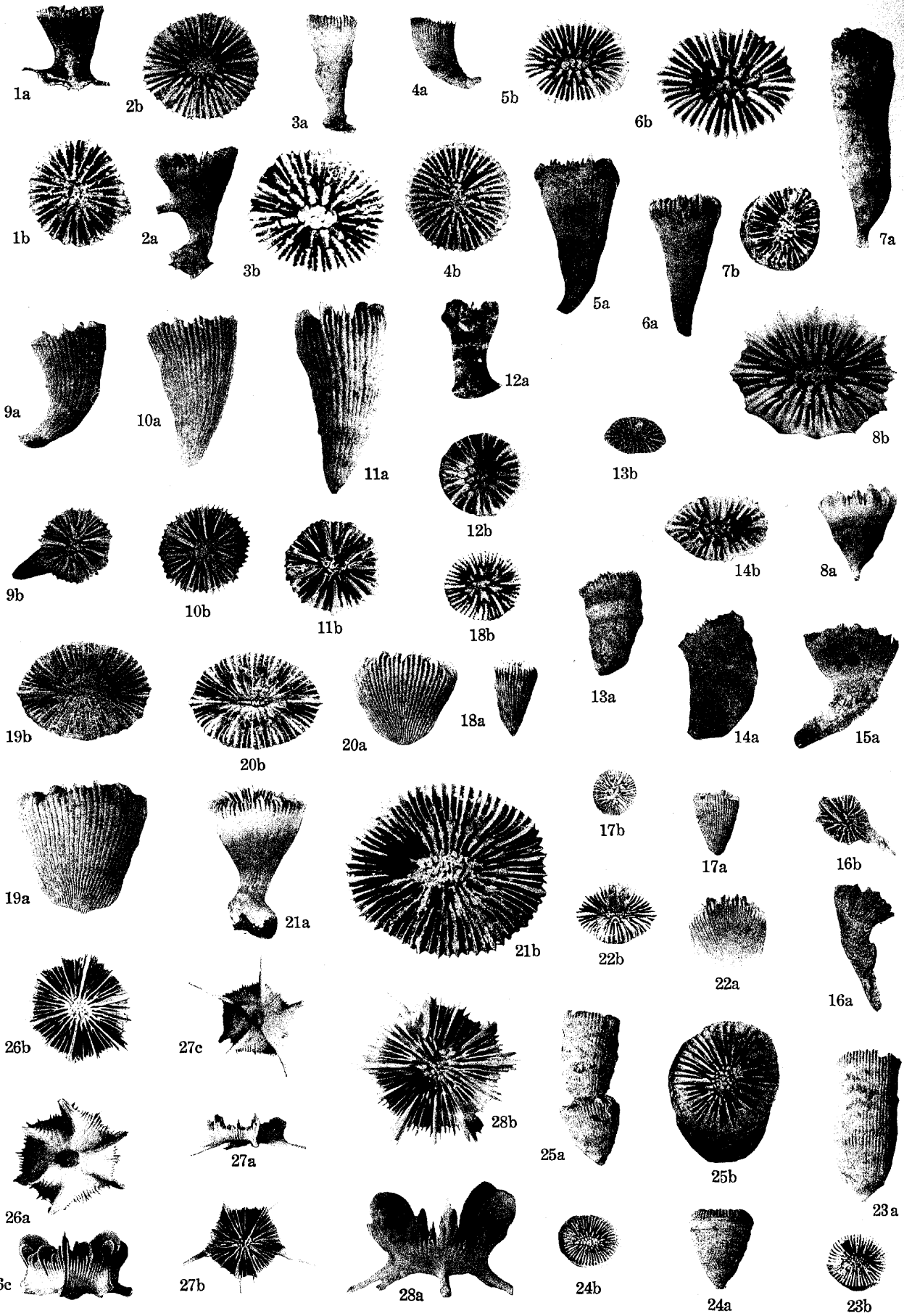
Figs. 19, 20. *Trochocyathus pileus* ALCOCK. Fig. 19a, ×2; Fig. 19b, ×2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60737. Fig. 20a, × 1.5; Fig. 20b, × 2. Loc. Sôyô-maru St. 423, off Kusikino, Kagosima-ken. Reg. No. 53686.

Fig. 21. *Trochocyathus caryophylloides* ALCOCK. Fig. 21a, × 1; Fig. 21b, × 2. Loc. Sôyô-maru St. 331, off Asizuri-zaki, Kôti-ken. Reg. No. 53626.

Fig. 22. *Trochocyathus* (*Tropidocyathus*) *wellsi* YABE & EGUCHI, n.; nat. size. Loc. Sôyô-maru St. 439, off Gotô Islands. Reg. No. 53691.

Figs. 23–25. *Trochocyathus* (*Thecocyathus*) *hanzawai* YABE & EGUCHI. All in nat. size, except Fig. 25a × 2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 60749.

Figs. 26–28. *Odontocyathus spiniger* (V. MARENZELLER); nat. size. Fig. 26. Loc. Sôyô-maru St. 417, off Satuma peninsula. Reg. No. 50241. Fig. 27. Loc. Sôyô-maru St. 210, off Seto, Wakayama-ken. Reg. No. 50239. Fig. 28. Loc. Sôyô-maru St. 293, W. of Tanega-sima, Kagosima-ken. Reg. No. 50238.



Kimura photo.

Explanation of Plate XI (III)

(a, lateral view; b, calicular view; c, basal or edgewise view)

Fig. 1. *Paracyathus pruinosus* ALCOCK. Fig. 1a, nat. size; Fig. 1b, × 2. Loc. Sôyô-maru St. 235, Kurose. Reg. No. 53681.

Figs. 2–5. *Heterocyathus aequicostatus* MILNE EDWARDS & HAIME; × 2. Figs. 2, 3. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 53657. Fig. 4. Loc. Sôyô-maru St. 332. Reg. No. 53653. Fig. 5. Loc. Sôyô-maru St. 316, off Hosozima, Miyazaki-ken. Reg. No. 53661.

Fig. 6. *Heterocyathus japonicus* (VERRILL); × 2. Loc. Sôyô-maru St. 83. Reg. No. 53670.

Fig. 7. *Flabellum pavoninum* LESSON; nat. size. Three views of a specimen. Loc. Sôyô-maru St. 437. Reg. No. 43448.

Fig. 8. *Flabellum pavoninum magnificum* v. MARENZELLER; nat. size. Three views of a specimen. Loc. Sôyô-maru St. 416, off Makurazaki, Kagosima-ken. Reg. No. 50094.

Fig. 9. *Flabellum pavoninum paripavoninum* ALCOCK; nat. size. Three views of a specimen. Sôyô-maru St. 419. Reg. No. 43441.

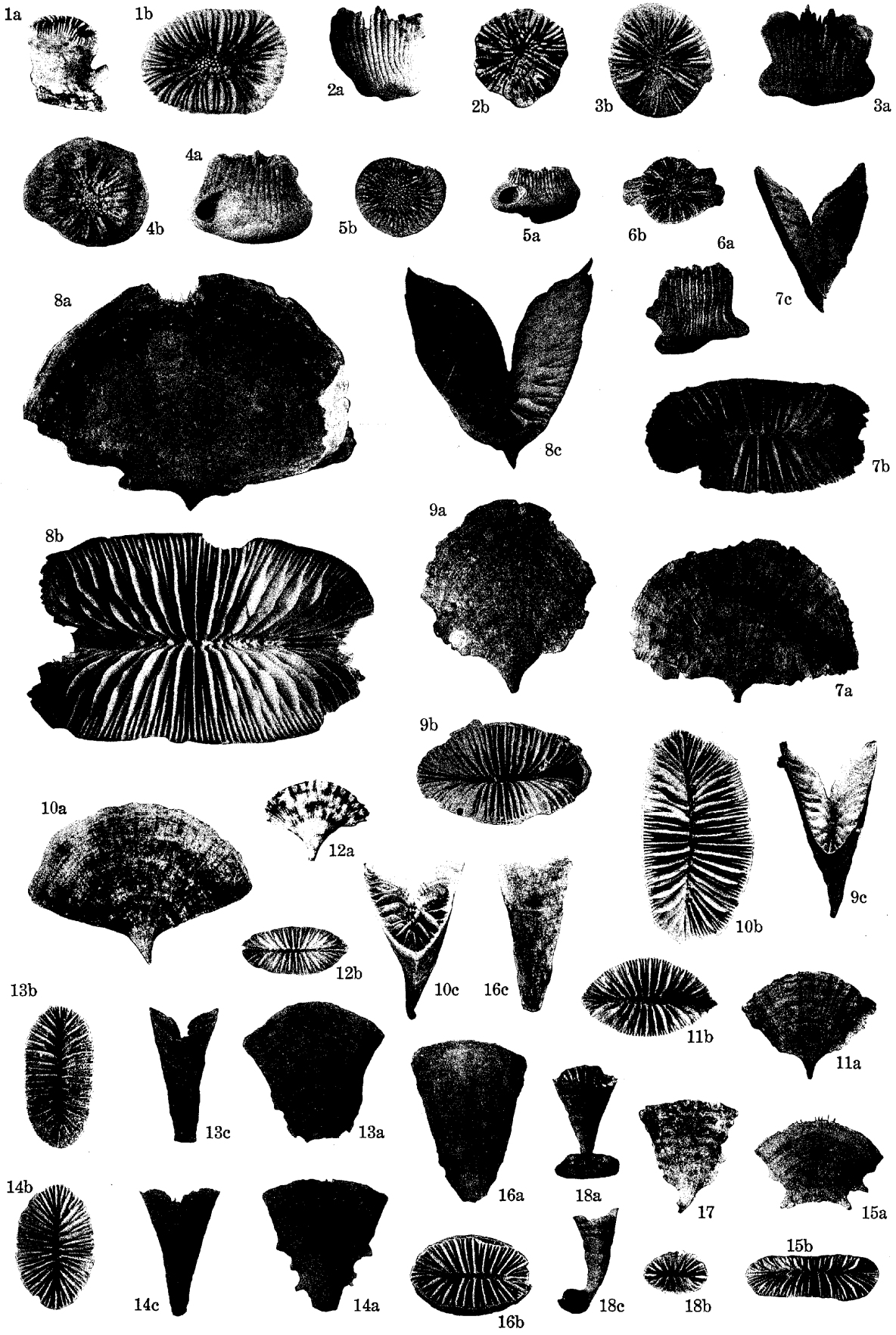
Figs. 10–12. *Flabellum distinctum* MILNE EDWARDS & HAIME; nat. size. Three different forms belonging to the same species. Fig. 10, a specimen safely assignable to *F. patens* MOSELEY. Loc. Sôyô-maru St. 5. Reg. No. 39730. Fig. 11, a specimen safely assignable to *F. australe* MOSELEY. Loc. Sôyô-maru St .188, Seno-umi. Reg. No. 50848. Fig. 12, a specimen similar to *F. suluense* ALCOCK. Loc. Sôyô-maru St. 220, Tosa Bay. Reg. No. 39736.

Figs. 13, 14. *Flabellum rubrum* (QUOY & GAIMARD); nat. size. Two specimens in three different views. Fig. 13. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 39744. Fig. 14. Loc. Sôyô-maru St. 107, off Bôsyû, Tiba-ken. Reg. No. 50231.

Fig. 15. *Flabellum rubrum debile* MILNE EDWARDS & HAIME (*Fl. rubrum stokesii* MILNE EDWARDS & HAIME); nat. size. Loc. Sôyô-maru St. 337. Reg. No. 50228.

Figs. 16, 17. *Flabellum transversale* MOSELEY; nat. size. Fig. 16, three views of a common form. Loc. Sôyô-maru St. 645. Reg. No. 39729. Fig. 17, facial view of a young, abnormal specimen. Loc. Sôyô-maru St. 465, Tyôsen kaikyô. Reg. No. 39728.

Fig. 18. *Flabellum transversale conicum* YABE & EGUCHI, n.; nat. size. Three views of a specimen, Loc. Sôyô-maru St. 412. Reg. No. 39727.



Kimura photo

Explanation of Plate XII (IV)

(a, lateral view; b, calicular view; c, basal or edgewise view)

Fig. 1. *Flabellum deludens* V. MARENZELLER; nat. size. Three different views of a specimen. Loc. Sôyô-maru St. 319. Reg. No. 50096.

Fig. 2. *Flabellum japonicum* MOSELEY; nat. size. Three different views of a specimen. Loc. Sôyô-maru St. 200. Reg. No. 43444.

Fig. 3. *Flabellum* cf. *apertum* MOSELEY; nat. size. Three different views of specimen. Loc. Sôyô-maru St. 421. Reg. No. 43443.

Fig. 4. *Rhizotrochus niinoi* YABE & EGUCHI; × 2. Loc. Hukui-maru St. 19. Reg. No. 60820.

Fig. 5. *Bathyactis palifera* ALCOCK; × ca. 5. Loc. Sôyô-maru St. 412. Reg. No. 58913.

Figs. 6, 7. *Bathyactis kikaiensis* YABE & EGUCHI; × 2. Loc. Ryûkyû limestone of Kikai-zima. Reg. No. 50236.

Fig. 8. *Stephanophyllia* (*Letepsammia*) *japonica* YABE & EGUCHI; × 2. Loc. Ryûkyû limestone of Kikai-zima. Reg. No. 50236.

Fig. 9. *Balanophyllia ponderosa* V.D. HORST. Fig. 9a, nat. size; Fig. 9b, ×2. Loc. Sôyô-maru St. 429. Reg. No. 58991.

Fig. 10. *Balanophyllia* cf. *italica* (MICHELIN). Fig. 10a, nat. size; Fig. 10b, × 2. Loc. Sôyô-maru St. 638. Reg. No. 59025.

Figs. 11, 12. *Balanophyllia affinis* SEMPER. Figs. 11b, 12b, × 2; Figs. 11a, 12a, nat. size. Loc. Sôyô-maru St. 429. Reg. No. 58990.

Fig. 13. *Balanophyllia* cf. *cumingii* MILNE EDWARDS & HAIME; × 2. Loc. Ryûkyû limestone of Kikai-zima, Kagosima-ken. Reg. No. 58984.

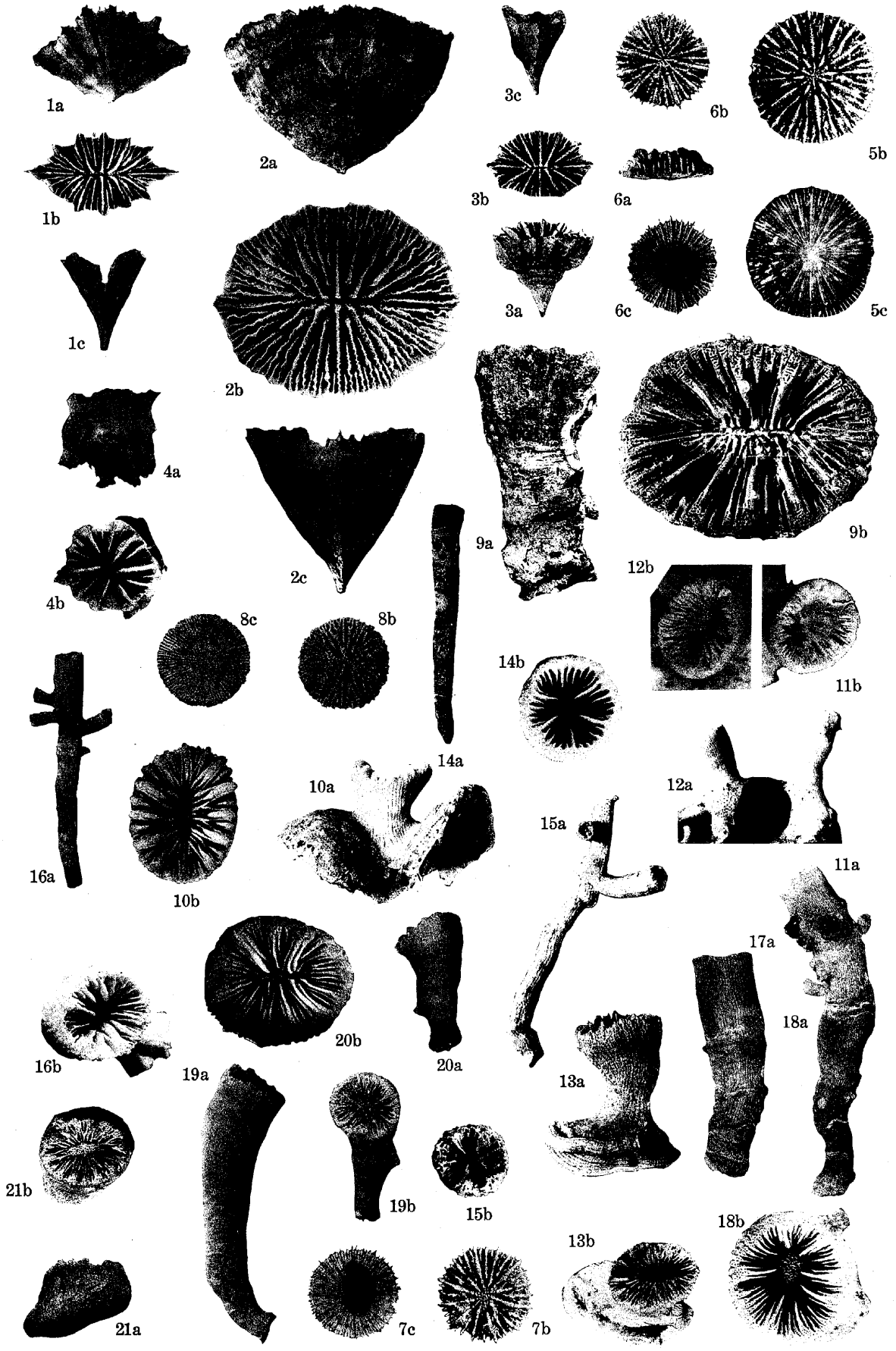
Figs. 14–16. *Balanophyllia fistula* ALCOCK. Fig. 14a, nat. size; Fig. 14b, × 3. Loc. Sôyô-maru St. 316. Reg. No. 58971. Fig. 15a, nat. size; Fig. 15b, × 5. Loc. Sôyô-maru St. 231. Reg. No. 58990. Fig. 16a, nat. size; Fig. 16b, × 3. Loc. Sôyô-maru St. 210. Reg. No. 58969.

Figs. 17, 18. *Balanophyllia rediviva* MOSELEY. Figs. 17, 18a, nat. size; Fig. 18b, × 2. Loc. Sôyô-maru St. 212. Reg. No. 58931.

Fig. 19. *Balanophyllia* sp. (*B.* aff. *imperialis* KENT); × 2. Loc. Ryûkyû limestone of Kikai-zima. Reg. No. 58940.

Fig. 21. *Heteropsammia ovalis japonica* YABE & EGUCHI; × 2. Loc. Ryûkyû limestone of Kikai-zima. Reg. No. 60748.

Fig. 20. *Balanophyllia* sp. Fig. 20a, nat. size; Fig. 20b, × 2. Loc. Sôyô-maru St. 429. Reg. No. 58993.



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